



# CONDENSING GAS FURNACE

## HIGHBOY AND COUNTERFLOW

### INSTALLATION AND SERVICE MANUAL

#### MODELS

##### FOR USE WITH NATURAL GAS

CHB-50N, CHB-75N, CHB-100N, CHB-125N

CDB-50N, CDB-75N, CDB-100N, CDB-125N

##### FOR USE WITH L.P. GAS (PROPANE)

CHB-50P, CHB-75P, CHB-100P, CHB-125P

CDB-50P, CDB-75P, CDB-100P, CDB-125P

**⚠WARNING:** IF YOU DO NOT FOLLOW THE SAFETY PRECAUTIONS BELOW AND IN THIS MANUAL, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY, OR LOSS OF LIFE.

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

WHAT TO DO IF YOU SMELL GAS:

- DO NOT TRY TO LIGHT ANY APPLIANCE.
- DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.
- LEAVE THE BUILDING IMMEDIATELY.
- IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.
- IF YOU CANNOT REACH YOUR GAS SUPPLIER; CALL THE FIRE DEPARTMENT.

INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER. (REFERRED TO IN THESE INSTRUCTIONS AS A QUALIFIED HEATING CONTRACTOR).

PLEASE READ THESE INSTRUCTIONS PRIOR TO INSTALLATION, INITIAL FIRING, AND BEFORE PERFORMING ANY SERVICE OR MAINTENANCE. THESE INSTRUCTIONS MUST BE LEFT WITH THE HOMEOWNER AND SHOULD BE RETAINED FOR FUTURE REFERENCE BY QUALIFIED SERVICE PERSONNEL.

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MADE IN USA



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All installations and services must be performed by qualified service personnel.

## I. SAFETY INFORMATION

This and the following page contain reproductions of the various warning and instruction labels placed on the Thermo Pride Condensing Gas Furnaces. Please read and comply with the contents of these labels.

MODEL NO. **CHB**  
SERIAL NO. **[REDACTED]**

DIRECT VENT FORCED AIR FURNACE  
FOR INDOOR INSTALLATION IN BUILDING  
CONSTRUCTED ON SITE.  
ANSI Z21.47a-CSA-2.3a-1999  
CENTRAL FURNACE  
CATEGORY IV TYPE FSP  
115V 1PH 60CY MAX. TOTAL INPUT AMPS  
INPUT BTU/HR GAS  
NORMAL MANIFOLD PRESSURE INCHES W.C.  
MIN. GAS SUPPLY PRESSURE FOR INPUT ADJUSTMENT IN. W.C.  
MAX. GAS SUPPLY PRESSURE 14.0 INCHES W.C.  
AIR TEMPERATURE RISE 55°F TO 85°F  
MAX. EXTERNAL STATIC PRESSURE INCHES W.C.  
MAXIMUM OUTLET AIR TEMPERATURE °F  
CERTIFIED FOR CLOSET INSTALLATION AT MINIMUM CLEARANCES  
TO COMBUSTIBLE CONSTRUCTION AS SHOWN.  
TOP FRONT BACK LS/RS FLUE PIPE  
(INCHES) 1 6 0 0 0  
FOR INSTALLATION ON COMBUSTIBLE FLOORING.

THIS FURNACE REQUIRES A SPECIAL VENTING SYSTEM. REFER TO  
INSTALLATION INSTRUCTIONS NO. MG-985 FOR PARTS LIST AND  
METHOD OF INSTALLATION.



MAX. VENT LENGTH 35 FEET. MIN. VENT LENGTH 8 FEET.  
MIN. WALL THICKNESS THROUGH WHICH THE VENT/AIR INTAKE  
PIPES MAY PASS IS 2 INCHES AND THE MAX. IS 18 INCHES.

FILTERS MUST BE INSTALLED EXTERNAL TO THE FURNACE CASING.

THIS FURNACE MUST BE INSTALLED IN ACCORDANCE WITH  
THERMO PRODUCTS INSTRUCTIONS AND LOCAL CODES. IN  
ABSENCE OF LOCAL CODES, FOLLOW THE NATIONAL FUEL  
GAS CODE - ANSI Z223.1

THERMO PRODUCTS, LLC.  
P.O. BOX 217 - NORTH JUDSON, IN 46366  
390423/E-4199-NS  
1000-ET 4/7/13 MA

MODEL NO. **CDB**  
SERIAL NO. **[REDACTED]**

DIRECT VENT FORCED AIR FURNACE  
FOR INDOOR INSTALLATION IN BUILDING  
CONSTRUCTED ON SITE.  
ANSI Z21.47a-CSA-2.3a-1999  
CENTRAL FURNACE  
CATEGORY IV TYPE FSP  
115V 1PH 60CY MAX. TOTAL INPUT AMPS  
INPUT BTU/HR GAS  
NORMAL MANIFOLD PRESSURE INCHES W.C.  
MIN. GAS SUPPLY PRESSURE FOR INPUT ADJUSTMENT IN. W.C.  
MAX. GAS SUPPLY PRESSURE 14.0 INCHES W.C.  
AIR TEMPERATURE RISE 55°F TO 85°F  
MAX. EXTERNAL STATIC PRESSURE INCHES W.C.  
MAXIMUM OUTLET AIR TEMPERATURE °F  
CERTIFIED FOR CLOSET INSTALLATION AT MINIMUM CLEARANCES  
TO COMBUSTIBLE CONSTRUCTION AS SHOWN.  
TOP FRONT BACK LS/RS FLUE PIPE  
(INCHES) 1 6 0 0 0  
FOR INSTALLATION ON NON-COMBUSTIBLE FLOORS ONLY.  
FOR INSTALLATION ON COMBUSTIBLE FLOORING ONLY WHEN  
INSTALLED ON SPECIAL BASE PART NO. 50CA BASE.

THIS FURNACE REQUIRES A SPECIAL VENTING SYSTEM. REFER TO  
INSTALLATION INSTRUCTIONS NO. MG-985 FOR PARTS LIST AND  
METHOD OF INSTALLATION.

MAX. VENT LENGTH 35 FEET. MIN. VENT LENGTH 8 FEET.  
MIN. WALL THICKNESS THROUGH WHICH THE VENT/AIR INTAKE  
PIPES MAY PASS IS 2 INCHES AND THE MAX. IS 18 INCHES.

FILTERS MUST BE INSTALLED EXTERNAL TO THE FURNACE CASING.

THIS FURNACE MUST BE INSTALLED IN ACCORDANCE WITH  
THERMO PRODUCTS INSTRUCTIONS AND LOCAL CODES. IN  
ABSENCE OF LOCAL CODES, FOLLOW THE NATIONAL FUEL  
GAS CODE - ANSI Z223.1

THERMO PRODUCTS, LLC.  
P.O. BOX 217 - NORTH JUDSON, IN 46366  
390423/E-4199-NS  
1018-ET 4/7/13 MA

### WARNING

Hazardous flue gas.

Can cause personal injury  
or loss of life.

Inspect rubber hose  
connecting inducer  
outlet to PVC tee and  
all vent system joints for  
leak free connections  
before furnace operation.

390411

## WARNING

THIS COMPARTMENT MUST BE  
CLOSED EXCEPT WHEN SERVICING

THIS FURNACE MUST BE INSTALLED SO THERE ARE  
PROVISIONS FOR VENTILATING AIR.

390410

### REMOVE THIS PANEL FIRST IN ORDER TO REMOVE BLOWER DOOR.

INSTALLATION AND USERS MANUALS  
ARE LOCATED BEHIND BLOWER DOOR.

390289

OUTSIDE POWER SOURCE  
CONNECT 115v 60Hz TO  
L1 HOT AND L2 COMMON.

390229

**All installations and services must be performed by qualified service personnel.**

This and the previous page contain reproductions of the various warning and instruction labels placed on the Thermo Pride Condensing Gas Furnaces. Please read and comply with the contents of these labels.

**FOR YOUR SAFETY READ BEFORE OPERATING**

**WARNING:** If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.



**WHAT TO DO IF YOU SMELL GAS**

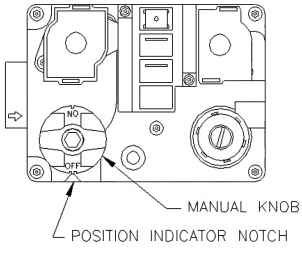
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

**OPERATING INSTRUCTIONS**


1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Turn gas control knob clockwise  to "OFF" position.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
7. Turn gas control knob  counterclockwise to "ON" position.
8. Turn on all electric power to unit.
9. Set thermostat to desired setting.
10. If appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.



MANUAL KNOB

POSITION INDICATOR NOTCH

**TO TURN OFF GAS TO APPLIANCE**

1. Set thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Turn gas control knob clockwise  to "OFF" position.

390434

**FOR YOUR SAFETY**  
WHAT TO DO IF YOU SMELL GAS:  
1. DO NOT TRY TO LIGHT ANY APPLIANCE.  
2. DO NOT TOUCH ANY ELECTRICAL SWITCH.  
3. DO NOT USE ANY PHONE IN YOUR BUILDING.  
4. IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.  
5. IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.

**FOR YOUR SAFETY**  
DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.  
THIS UNIT MUST BE INSTALLED AND SERVICED BY A QUALIFIED CONTRACTOR ONLY.  
OPERATING INSTRUCTIONS ARE LOCATED INSIDE APPLIANCE NEAR BURNER ASSEMBLY.

**WARNING****SPECIAL HOMEOWNERS INSTRUCTIONS**

- IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.
- FOR SAFE OPERATION IT IS THE RESPONSIBILITY OF THE OWNER AND/OR USER THAT THE BURNER, CHIMNEY/VENT PIPE, HEAT EXCHANGER AND CONTROLS SHOULD BE INSPECTED EVERY YEAR BY A QUALIFIED HEATING CONTRACTOR.
- THE OWNER AND/OR USER SHOULD ALSO CONDUCT PERIODIC VISUAL INSPECTIONS. REFER TO THE USERS INFORMATION MANUAL PROVIDED WITH THIS FURNACE FOR DETAILS.
- ANY DEFICIENCIES NOTED MUST BE CORRECTED AT ONCE BY A QUALIFIED HEATING CONTRACTOR. DO NOT ATTEMPT TO MAKE REPAIRS YOURSELF!
- FOR ASSISTANCE OR ADDITIONAL INFORMATION CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

**CAUTION**  
MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY. SHUT OFF FURNACE BEFORE REMOVING THIS PANEL.

FILTER MAINTENANCE: WHEN IT BECOMES NECESSARY TO REPLACE OR WASH FILTER REMOVE THE DIRTY FILTER FROM THE RACKS PROVIDED AND WASH OR REPLACE WITH IDENTICAL NEW FILTERS.

**DO NOT REMOVE THIS LABEL**

390231

**All installations and services must be performed by qualified service personnel.**

The following safety information should be read, understood, and followed by the installer.

1. Use only with type of gas approved for this furnace. Refer to furnace rating plate.
2. Do not install this furnace where it could be exposed to drafts or other wind or moisture conditions. Refer to Section IV, B thru I, of this manual.
3. Provide adequate combustion and ventilation air to the furnace space. Refer to Section IV, B, of this manual.
4. Connect this furnace to an approved vent system only. Combustion products must be carried outdoors. Refer to Section IV, D thru H, of this manual.
5. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. Refer to Section IV, J thru L, of this manual.
6. Always install furnace with a duct system that has an external static pressure within the allowable range. Refer to Section IV, M, of this manual.
7. Make sure supply and return air ducts are completely sealed to the furnace casing. Return air ductwork must run to an area outside the air space where the furnace is located and be sealed where it runs through walls, ceilings, or floors. Refer to Section IV, M, of this manual.

All installations and services must be performed by qualified service personnel.

The following pages contain various warnings and cautions found throughout the Thermo Pride Highboy and Dual Poise Condensing Gas Furnace Manual. Please read and comply with the statements below.

**⚠WARNING:** *This furnace is not to be used for temporary heating of buildings or structures under construction.*

**⚠CAUTION:** *These high efficiency condensing furnaces are not certified for and shall not be vented into a standard or any type of chimney.*

**⚠WARNING:** *These furnaces may not be common vented with any other appliance.*

**⚠CAUTION:** *The vent and air intake elbows must be kept away from bushes, shrubs or any vegetation that may restrict the flow of flue products. It must also be kept clear of any leaves, weeds or other combustible materials. Keep the vent hood clear of snow. Avoid locating the terminals in areas where standing water or condensate drippage may be a problem.*

**⚠WARNING:** *This CHB/CDB furnace has been designed to be installed as a direct vent system and must have its combustion air brought in from outside the conditioned space. The failure to install the vent/air intake system as specified in these instructions will void the heat exchanger warranty and may result in property damage, personal injury or loss of life.*

**⚠CAUTION:** *Outside combustion air must not come from an area that is directly adjacent to a pool, hot tub or spa. Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. Should acid compounds form in your furnace, it may reduce the life of the furnace.*

**⚠WARNING:** *Because of the potential of odorant fade, a gas leak may not be detected by smell. If this furnace is installed below grade, contact your gas supplier for a gas detector.*

**⚠WARNING:** *All gas piping must be leak tested using a soap and water solution (when the gas is turned on) following the procedure outlined in Section IV, J, of this manual. A final test for gas leakage must be made after purging the gas line (refer to Section V, B, of this manual). This test must be conducted with the unit operating and should include the furnace piping and gas valve. Never use an open flame to check for a gas leak.*

All installations and services must be performed by qualified service personnel.

**⚠CAUTION:** *Care must be taken not to wet electronic components during leak test. Wetting the primary ignition module may damage its circuitry and cause a hazardous situation. Dry moisture from all leads and terminals if wetting occurs. Wait at least 24 hours for the circuit to fully dry before energizing the burner circuit.*

**⚠WARNING:** *The furnace and its individual gas shutoff valve must be disconnected from the gas supply during pressure testing of the gas supply system at pressures in excess of 1/2 PSIG or 14.0" w.c. The furnace must be isolated from the gas supply by closing its manual shut off valve at test pressures equal to or less than 1/2 PSIG or 14.0" w.c.*

**⚠WARNING:** *Copper and brass tubing and fittings (except tin lined) shall not be used if the gas contains more than a trace (0.3 grains per 100 cubic ft.) of hydrogen sulfide gas. Check with your gas supplier.*

**⚠WARNING:** *TURN OFF THE ELECTRICAL POWER to the furnace before attempting to change blower speed wiring.*

**⚠WARNING:** *Turn off power to furnace before it is placed into service. The gas piping system must have been leak tested by a qualified heating contractor. (See Section IV, J, of these instructions on the installation of gas piping).*

**⚠WARNING:** *It may be necessary to purge the air out of the gas line for initial start-up of the furnace after installation. This should be done by a qualified heating contractor. If excessive gas escapes when purging the gas supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because the specific gravity of LP gas allows it to accumulate at floor level at a dangerous concentration. For remainder of operating instructions, reference Users Information Manual.*

**⚠WARNING:** *Heat exchanger oil will burn off on initial firing creating an unpleasant odor. To prevent this odor from occurring more than once, it is suggested that:*

- 1. A window(s) be opened.*
- 2. The thermostat set at highest setting.*
- 3. The furnace remain running at conditions 1&2 for 30 minutes or until odor has dissipated.*

**⚠CAUTION:** *The CHB/CDB furnace models are sealed combustion design which does not require an air shutter adjustment (air shutters are not used) for proper flame characteristics. Burner box access cover must always be secured with all screws in place and tightened before operating furnace.*

**⚠WARNING:** *Personal injury or property damage could result from repair or service of this furnace by anyone other than a qualified heating contractor. Only the homeowner/user routine maintenance described in the Users Information Manual may be performed by the user.*

All installations and services must be performed by qualified service personnel.

**⚠WARNING:** *To avoid injury from moving parts, shut off the power to the furnace before removing blower compartment door.*

**⚠CAUTION:** *Label wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.*

**⚠CAUTION:** *The inducer motor mounting plate gasket and the collector box gasket must be replaced if they show any sign of having been damaged.*

**⚠WARNING:** *Power must be disconnected before servicing.*



**All installations and services must be performed by qualified service personnel.**

## **II. FURNACE SPECIFICATIONS**

### **CHB SERIES**

<b>MODEL NO.</b>	<b>CHB-50</b>	<b>CHB-75</b>	<b>CHB-100</b>	<b>CHB-125</b>
BTU/HR INPUT	50,000	75,000	100,000	125,000
BTU/HR OUTPUT	46,650	68,550	92,500	115,375
HT. OF CASING	44 1/4"	44 1/4"	44 1/4"	44 1/4"
WIDTH OF CASING	19"	19"	21"	24"
DEPTH OF CASING	27 1/2"	27 1/2"	27 1/2"	27 1/2"
WARM AIR OUTLET	17X18	17X18	19X18	22X18
RETURN AIR INLET	25X16	25X16	25X16	25X16
DIA. OF FLUE	2"	2"	3"	3"
DIA. OF COMBUSTION AIR INTAKE	2"	2"	3"	3"
CFM @ .2" & .5" w.c. EXTERNAL STATIC PRESSURE	.2" .5"	.2" .5"	.2" .5"	.2" .5"
@ HI SPEED	1100 860	1600 1380	1940 1700	2770 2060
@ MH SPEED	1000 720	1250 1150	1720 1540	1800 1700
@ ML SPEED	-- --	1030 930	1530 1380	1730 1600
@ LO SPEED	610 420	820 700	1340 1220	1670 1550
TEMPERATURE RISE	70	70	70	70
BLOWER MOTOR HP	.20	.41	.50	.75
NO. OF SPEEDS	3	4	4	4
RUN CAPACITOR	10 mfd	10 mfd	10 mfd	15 mfd
LARGEST RECOMMENDED AIR COND.	2 Ton	3.5 Ton	4 Ton	5 Ton
SIZE OF FILTERS	24 3/4"x 15 3/4"	24 3/4"x 15 3/4"	24 3/4"x 15 3/4"	24 3/4"x 19 3/4"

- BTU output based on annual fuel utilization efficiency rated by manufacturer.
- On all outlet and inlet dimensions, the first dimension is width.
- To permit largest recommended air conditioning (at .5 static pressure), selection of the highest motor speed is required.

**All installations and services must be performed by qualified service personnel.**

### **CDB SERIES**

<b>MODEL NO.</b>	<b>CDB-50</b>	<b>CDB-75</b>	<b>CDB-100</b>	<b>CDB-125</b>
BTU/HR INPUT	50,000	75,000	100,000	125,000
BTU/HR OUTPUT	45,700	67,725	90,700	113,250
HT. OF CASING	46 1/4"	46 1/4"	46 1/4"	46 1/4"
WIDTH OF CASING	19"	19"	21"	24"
DEPTH OF CASING	27 1/2"	27 1/2"	27 1/2"	27 1/2"
WARM AIR OUTLET	17X18	17X18	19X18	22X18
RETURN AIR INLET	17X22	17X22	19X22	22X22
DIA. OF FLUE	2"	2"	3"	3"
DIA. OF COMBUSTION AIR INTAKE	2"	2"	3"	3"
CFM @ .2" & .5" w.c. EXTERNAL STATIC PRESSURE	.2" .5"	.2" .5"	.2" .5"	.2" .5"
@ HI SPEED	1120 930	1530 1340	1830 1590	2280 2010
@ . SPEED	1000 750	1270 1110	1660 1460	1830 1650
@ ML SPEED	-- --	1050 930	1520 1340	1750 1570
@ LO SPEED	616 420	850 720	1370 1230	1660 1530
TEMPERATURE RISE	70	70	70	70
BLOWER MOTOR HP	.20	.41	.50	.75
NO. OF SPEEDS	3	4	4	4
RUN CAPACITOR	10 mfd	10 mfd	10 mfd	15 mfd
LARGEST RECOMMENDED AIR COND.	2 Ton	3.5 Ton	4 Ton	5 Ton
SIZE OF FILTERS	21 3/4"x 14"(2)	21 3/4"x 14"(2)	21 3/4"x 14"(2)	21 3/4"x 14"(2)

- BTU output based on annual fuel utilization efficiency rated by manufacturer.
- On all outlet and inlet dimensions, the first dimension is width.
- To permit largest recommended air conditioning (at .5 static pressure), selection of the highest motor speed is required.
- Electrical characteristics at 115 volts, 60 Hz., 1 phase (less than 15 amps. for all models).
- All specifications are subject to change without notice.

All installations and services must be performed by qualified service personnel.

**INSTALLATION PARTS PACKAGES - CHB50-75**

<b>PARTS PACKAGE</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
<b>#AOPS4256</b>			
	2 3/8" ID radiator hose	410017	1
	thermostat lead bushing	350750	1
	PVC trap assembly	320075	1
	#8 x 3/4 coated TEK screws		
	-for mounting trap &		
	inlet/outlet collars	300283	4
	1/2" OD x 3/8" ID vinyl tubing	410016	24"
	2x4 electrical J-box	350024	1
	2x4 electrical J-box cover	350020	1
	#8x1/2 TEK screws		
	-for mounting 2x4 J-box	300208	2
	#10-32x1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	grounding instructions	MG-966	1
	wire nut	300132	2
	spring clamp, 3/8" red	300258	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	drain hose grommet	350446	1
	spring clamp, 11/16"	300299	1
	installation notice	MG-987	1
	PVC tee assembly, 2" dia.	320077	1

All installations and services must be performed by qualified service personnel.

**INSTALLATION PARTS PACKAGES - CHB100-125**

<b>PARTS PACKAGE</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
<b>#AOPS4257</b>			
	2 3/8" ID radiator hose	410017	1
	thermostat lead bushing	350750	1
	PVC trap assembly	320075	1
	#8 x 3/4 coated TEK screws		
	-for mounting trap &		
	inlet/outlet collars	300283	4
	1/2" OD x 3/8" ID vinyl tubing	410016	24"
	2x4 electrical J-box	350024	1
	2x4 electrical J-box cover	350020	1
	#8x1/2 TEK screws		
	-for mounting 2x4 J-box	300208	2
	#10-32x1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	grounding instructions	MG-966	1
	wire nut	300132	2
	spring clamp, 3/8" red	300258	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	drain hose grommet	350446	1
	spring clamp, 11/16"	300299	1
	installation notice	MG-987	1
	PVC tee assembly, 2 x 3" dia.	320076	1

**INSTALLATION PARTS PACKAGES - CDB50-75**

**All installations and services must be performed by qualified service personnel.**

<b>PARTS PACKAGE</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
<b>#AOPS4360</b>			
	2 3/8" ID radiator hose	410017	1
	thermostat lead bushing	350750	1
	PVC trap assembly	320075	1
	#8 x 3/4 coated TEK screws		
	-for mounting trap &		
	inlet/outlet collars	300283	6
	1/2" OD x 3/8" ID vinyl tubing	410016	24"
	2x4 electrical J-box	350024	1
	2x4 electrical J-box cover	350020	1
	#8x1/2 TEK screws		
	-for mounting 2x4 J-box	300208	2
	#10-32x1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	grounding instructions	MG-966	1
	wire nut	300132	2
	spring clamp, 3/8" red	300258	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	drain hose grommet	350446	1
	spring clamp, 1 1/16"	300299	1
	installation notice	MG-987	1
	PVC tee assembly, 2" dia.	370179	1
	pipe 2" dia. PVC 15"	14401	1
	bracket	14406	1

**INSTALLATION PARTS PACKAGES - CDB100-125**

**All installations and services must be performed by qualified service personnel.**

<b>PARTS PACKAGE #AOPS4361</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
	2 3/8" ID radiator hose	410017	1
	thermostat lead bushing	350750	1
	PVC trap assembly	320075	1
	#8 x 3/4 coated TEK screws		
	-for mounting trap &		
	inlet/outlet collars	300283	4
	1/2" OD x 3/8" ID vinyl tubing	410016	24"
	2x4 electrical J-box	350024	1
	2x4 electrical J-box cover	350020	1
	#8x1/2 TEK screws		
	-for mounting 2x4 J-box	300208	2
	#10-32x1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	grounding instructions	MG-966	1
	wire nut	300132	2
	spring clamp, 3/8" red	300258	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	drain hose grommet	350446	1
	spring clamp, 1 1/16"	300299	1
	installation notice	MG-987	1
	PVC tee assembly, 2 x 3" dia.	320076	1
	PVC tee assembly, 2" dia.	370179	1
	pipe. 2" dia. PVC 15"	14401	1
	bracket	14406	1
	reducer 2" x 3" PVC	320067	1

### **III. GENERAL INSTRUCTIONS**

**All installations and services must be performed by qualified service personnel.**

These instructions must be read in their entirety before installing the furnace. It is the installer's responsibility to do the following:

1. Inform and demonstrate to the user, the correct operation and maintenance of the appliance as explained in the Users Information Manual.
2. Inform the user of the hazards of flammable liquids and vapors and to remove such liquids and vapors from the vicinity of the appliance.

#### **IV. GENERAL INSTALLATION**

These Category Type IV furnaces are shipped completely assembled and wired (internally). See the Dealer Receiving and Freight Claim Procedure Section of the price guide for parts shortage or damage. The furnace and duct system must be adjusted to obtain a temperature rise of 55°F to 85°F through the furnace after installation. (See rating label located on side panel inside the furnace vestibule). The installation must conform with local codes, or in the absence of local codes, with the National Fuel Gas Codes ANSI Z223.1 LATEST EDITION and with these instructions.

***⚠WARNING: This furnace is not to be used for temporary heating of buildings or structures under construction.***

Many of the chemicals used during construction, when burned, form acid bearing condensate that can substantially reduce the life of the heat exchanger.

#### **A. CODES AND CLEARANCES**

The following items must be considered when choosing the size and location of the furnace.

1. All local codes and/or regulations take precedence over the instructions in this manual and should be followed accordingly. In the absence of local codes, installation must conform with these instructions, regulations of the National Fire Protection Association, provisions of National Electrical Code (ANSI/NFPA70 LATEST EDITION), and the National Fuel Gas Code (ANSI Z223.1 LATEST EDITION).
2. The BTU output capacity of the furnace proposed for installation should be based on a heat loss calculation made according to the manuals provided by the Air Conditioning Contractors of America (ACCA) or ASHRAE.
3. The furnace is to be installed level in a central location with respect to outlet registers. The furnace should be located as near the vent and inlet air terminals as practical to minimize the numbers of elbows and the length of any horizontal run of connecting flue and inlet air pipe.
4. Definitions of "COMBUSTIBLE MATERIAL" and "NON-COMBUSTIBLE" as issued by ANSI Z223.1 are as follows:

**All installations and services must be performed by qualified service personnel.**

**a. COMBUSTIBLE MATERIAL:**

Materials made of or surfaced with wood, compressed paper, plant fibers, plastics or other material that will ignite and burn whether flameproof or not or whether plastered or unplastered.

**b. NON-COMBUSTIBLE MATERIAL:**

Material which will not ignite and burn; such materials consisting entirely of steel, iron, brick, concrete, slate, glass, plaster or combination thereof.

**5. - MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS -**

<b>MODEL NO.</b>	<b>FROM SIDES OF FURNACE &amp; REAR</b>	<b>FRONT</b>	<b>TOP OF PLENUM</b>	<b>FROM THE FLUE OR VENT</b>	<b>SIDE OF PLENUM</b>
CHB-50	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CHB-75	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CHB-100	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CHB-125	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CDB-50	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CDB-75	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CDB-100	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
CDB-125	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.

**Table 1**

The CHB-50, 75, 100 and 125 furnaces may be installed on combustible flooring. The furnace shall not be installed directly on carpeting, tile or other combustible material other than wood flooring.

The CDB-50, 75, 100 and 125 furnaces are to be installed on non-combustible flooring only. The non-combustible floor bases model no. 50 CA base for CDB-(50,75) model no. 100 CA base for the model no. CDB-100 and model no. 125 CA base for CDB125 are available for the counterflow furnaces to allow their installations on combustible flooring.

These furnaces may be installed in an alcove or in a closet if the minimum clearances to combustible construction (listed previously) are met. The CDB series furnaces may be installed an attic or crawl space. Refer to section IV, B1 of this installation manual.

The minimum clearances are listed for fire protection. Clearance for servicing the front of the furnaces and to all points on the furnace requiring access must be 24"\*.

\*For horizontal furnace installation, refer to section IV, B1 of this installation manual.

**Equipment must be installed in accordance with regulations of the National Board of Fire Underwriters. Authorities having jurisdiction should be consulted before installations are made.**



**All installations and services must be performed by qualified service personnel.**

## **B. FURNACE LOCATION**

***⚠CAUTION:*** *These high efficiency condensing furnaces are not certified for and shall not be vented into a standard or any type of chimney.*

The following shall be considered for locating the furnace:

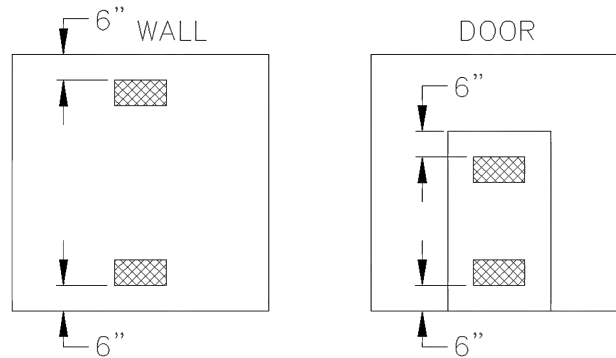
1. For best performance locate the furnace so that it is centralized with respect to the duct system and as near as possible to a floor drain since condensate drainage must be provided.
2. Place the unit so that proper venting can be achieved, with a minimum number of elbows, in accord with the instructions in this manual.
3. The furnace must be located on a level, dry surface. The furnace must be installed so that the electrical components are protected from water. If the area becomes wet or damp at times, the furnace should be raised above the floor using a concrete base, bricks, patio blocks, etc.

**NOTICE:** **Ensure furnace is level after installation to ensure proper drainage and operation.**

4. This furnace must be connected to a drain in accordance with these instructions. If it is not practical to connect the unit to a drain, a condensate pump must be used and can be ordered as an accessory, part number 350225. If an acid neutralizer kit is required by local code or the customer, it is available under part number 320095.
5. A furnace installed in a residential garage must be installed so the burners and ignition source are located 18 inches or higher above the floor. Also, the furnace must be located or protected to avoid physical damage by vehicles. The furnace shall be installed such that the electrical components are protected from water.
6. The area in which the furnace is located must have an adequate supply of air for ventilation. Open non-partitioned basements, below grade utility rooms without storm windows or rooms with loose access doors will generally permit adequate air infiltration. However, if the furnace is located in an area of the building with tight doors and windows, outside ventilation or an opening into another room is recommended. This can be accomplished with two rectangular openings located in a wall or door, one 6" from the ceiling or at the top of the door and one 6" from the floor or at the bottom of the door each having a free area of not less than 1 square inch per 1,000 BTUH input but not less than 100 square inches (see example in Figure 1). These openings must be free and unobstructed. Maintain a minimum 24" clearance to ventilation openings which provide ventilation air to the furnace (see Figure 1).

**All installations and services must be performed by qualified service personnel.**

**EXAMPLE:** 125,000 BTUH input furnace requires “two” openings of 125 square inches each. Minimum openings of 100 square inches are required regardless of the input.



**Figure 1**

## **B1. CDB HORIZONTAL APPLICATION**

The CDB50, 75, 100, and 125 furnaces may be installed in a horizontal position by placing the furnace on the left or right side (as viewed from the front in the upright position).

For left or right horizontal applications of the CDB series units, the rollout switch located on the burner box must be moved to the pre-punched mounting holes on the side of the burner box. Screws are provided in pre-punched holes at the required limit location. Remove these screws and use them to mount the limit to new location. Utilize previously removed limit mounting screws to fill voided holes at previous limit location (See Figure 1A).

For a right side horizontal application of the CDB series units, the hose from the single tap pressure switch(top switch) is already connected correctly(See Figure 1A).

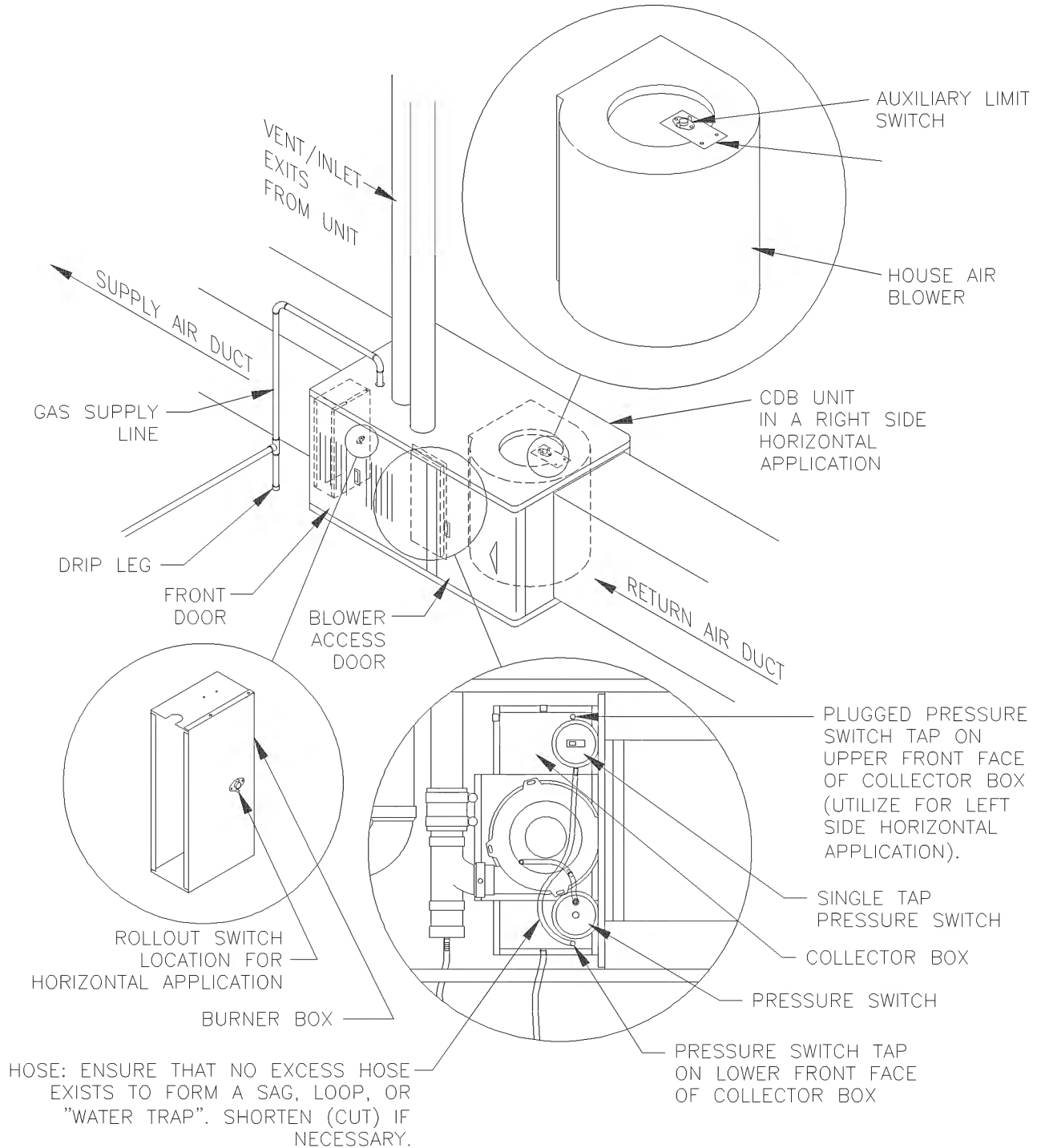
For a left side horizontal application of the CDB series units, the hose from the single tap pressure switch(bottom switch) must be moved to the lower front tap on the face of the collector box. Use the black cap removed from this tap to plug the original pressure switch tap.

**NOTE:** The hose, when moved, must be shortened (cut) to ensure that no excess hose exists to cause a sag, loop, or "water trap".

For a right side horizontal application of the CDB series units, the auxiliary limit switch located on the right side of the house air blower must be moved to the bracket on the opposite(left) side of the blower(See Figure 1A).

**All installations and services must be performed by qualified service personnel.**

**NOTE:** When the CDB is installed as horizontal unit, it is imperative that the auxiliary limit switch and bracket be located on the upper side of the house air blower; the burner rollout switch located on the burner box be relocated to the side of the burner box; and that the hose from the single tap pressure switch be connected to the lower tap on the front of the collector box (See Figure 1A).



CDB UNIT SHOWN IN A RIGHT SIDE HORIZONTAL APPLICATION

**Figure 1A.**

**All installations and services must be performed by qualified service personnel.**

The horizontal furnace installation should be on a service platform large enough to allow for proper clearances on all sides and service access to the front of the furnace(See Table 1). If the furnace is suspended, it must be supported at both ends and in the middle with clearance allowed for removal of both access doors. Gas supply line contact is only permissible between lines formed by the intersection of the top and two sides of the furnaces casing and the building joists, studs, or framing(See Figure 1A).

**Equipment must be installed in accordance with regulations of the National Board of Fire Underwriters and the National Fuel Gas Code. Authorities having jurisdiction should be consulted before installations are made.**

### **C. REPLACING AN EXISTING FURNACE FROM A COMMON VENT**

**⚠WARNING:** *These furnaces may not be common vented with any other appliance.*

### **D. GENERAL REQUIREMENTS FOR VENTING CHB/CDB**

The CHB/CDB furnace venting system must be installed by a qualified service person in accordance with local codes, the National Fuel Gas Code NFPA 54/ANSI Z223.1 (Latest Edition) and these instructions.

The following items and local code requirements must be followed:

1. The vent/air intake terminations outlined by Thermo Products in this manual must be used.
2. The entire vent/air intake system must be made of PVC Schedule 40 pipe.  
**NOTE:** All CHB/CDB furnaces may be installed with outside combustion air.
3. The flue vent pipe and combustion air pipe must be at least as large as the exhaust vent/air intake pipe specified by Thermo Products. No reduction in size is permissible. The (CHB, CDB)-50 and 75 require 2" Schedule 40 PVC pipe. The (CHB, CDB)-100 and 125 require 3" Schedule 40 PVC pipe.
4. This CHB/CDB furnace shall not be common vented with any other appliance including those burning solid fuels.
5. Horizontal runs of exhaust vent pipe shall slope upward at least 1/4" per foot from the outlet of the furnace (CHB's) or the outlet of the drain tee (CDB's) to the vent termination at the outside wall. This will permit proper drainage of the condensate. Horizontal runs of inlet vent pipe shall slope downward at least 1/4" per foot from the outlet of the last elbow or last horizontal run, before exiting the wall, to the vent termination at the outside wall.

**All installations and services must be performed by qualified service personnel.**

6. The vent pipe must be supported every 4 feet and at every joint to prevent pipe blockage caused by condensate trapped by a sag in the vent.
7. The maximum permissible vent length of straight pipe and number of elbows permitted for the exhaust vent and combustion air inlet is shown in Table 2 . The elbows shown are in addition to the length of straight pipe permitted. When counting elbows, all elbows used in the exhaust vent or combustion air intake must be counted. This includes elbows used inside the furnace jacket and termination elbows. In addition, up to three elbows may be dropped and the vent length extended five feet for each elbow dropped.

**MAXIMUM VENT LENGTH**

VENT SIZE	2 IN. PVC			3 IN. PVC		
FURNACE MODEL	VENT LENGTH (FT.)	EXHAUST VENT ELBOWS (NO.)	COMBUSTION AIR INTAKE ELBOWS (NO.)	VENT LENGTH (FT.)	EXHAUST VENT ELBOWS (NO.)	COMBUSTION AIR INTAKE ELBOWS (NO.)
CHB/CDB-50	35	8*	7	35	8*	7
CHB/CDB-75	35	8*	7	35	8*	7
CHB/CDB-100	NOT PERMITTED			35	8*	7
CHB/CDB-125	NOT PERMITTED			35	8*	7

\*Note the drain tee supplied with CHB/CDB furnaces count as 1 elbow.

\*\*Note: On the CHB 100 & 125 (2) 45° elbows can be substituted for (1) 90° elbow.

**Table 2**

Care should be taken to plan out the vent system to be as short as possible (but not shorter than 8 ft.) and to contain as few elbows as possible to insure the best possible operation of the furnace.

8. A hack saw may be used to cut the PVC pipe. It must be cut smoothly at right angles with all burrs removed. All joints must use standard PVC Schedule 40 elbows and couplings. Joints are not to be made by gluing and butting together the cut or raw edges of the vent pipe. The joints inside the vestibule should be sealed with a silicone caulk to allow for maintenance.

**Note: Do not use silicone caulk to seal the PVC sleeve or coupling to the metal air intake collar on the burner box. The screw securing the sleeve or coupling to the collar is sufficient.**

9. Vent connections shall be checked for leakage with the furnace induced draft blower running and with the vent termination blocked. A mild soap and water solution may be used to check for leaks.

10. Vent pipe passing through an unheated space must be insulated with 1.0" thick foil faced fiberglass insulation or its equivalent to prevent freezing of any condensate within the pipe.

11. Minimum clearance from the PVC pipe to combustible material is zero inches.

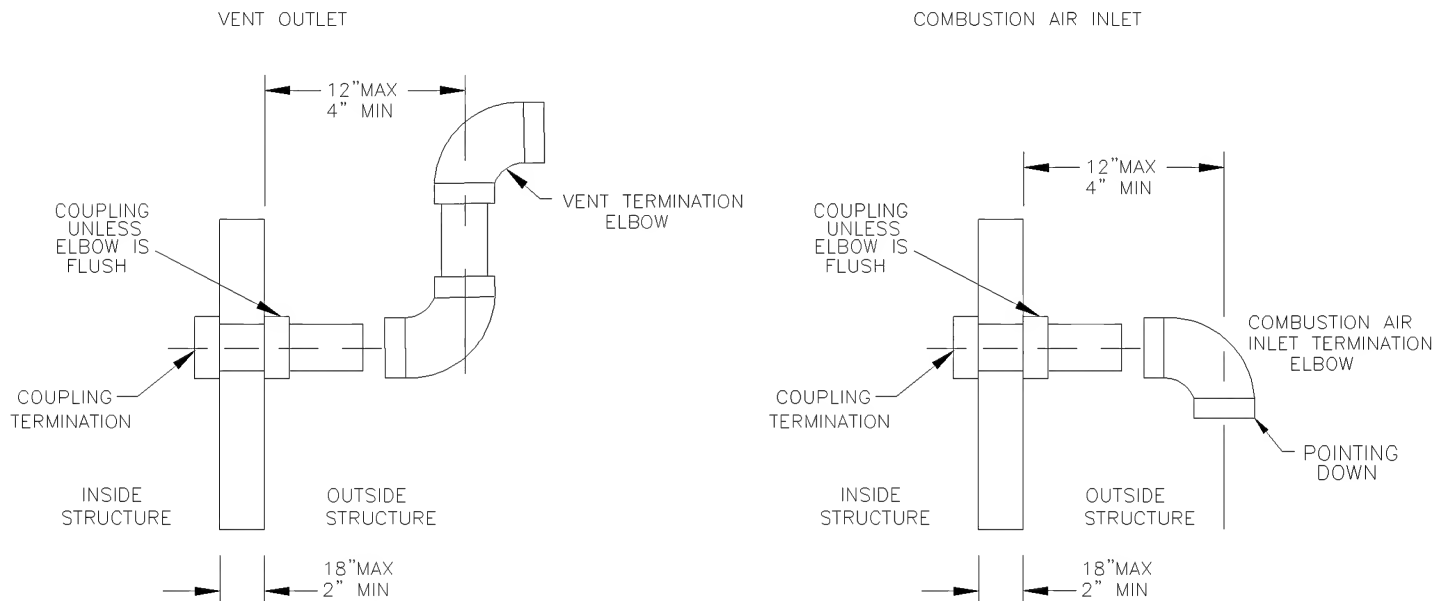
12. Screens are not required by Thermo Products for the vent and intake. However, optional stainless steel screens are available from Thermo Products, should the homeowner request them.

**All installations and services must be performed by qualified service personnel.**

**IMPORTANT:** The CHB/CDB furnace models may be vented either through the sidewall or roof. For sidewall instructions continue reading the following section. For roof venting refer to Section IV, H, of this manual.

## E. SIDEWALL VENTING

1. The maximum wall thickness through which the vent and combustion air pipes may pass is 18" and the minimum is 2". The maximum distance from the outer wall to the center of the elbow is 12" (See Figure 2).

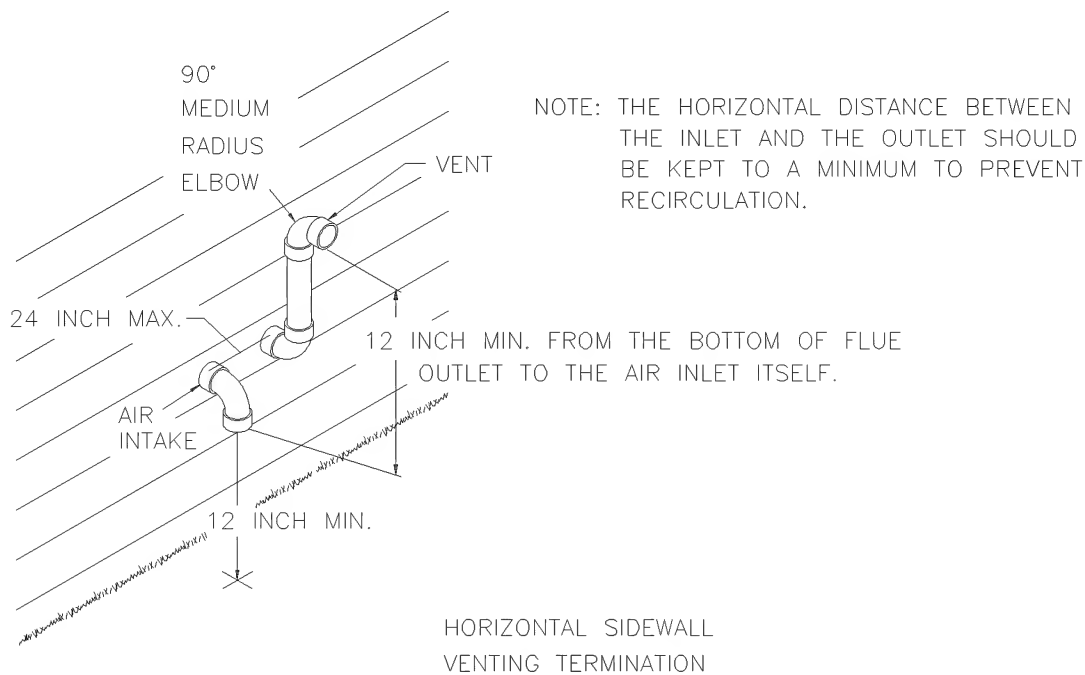


**Figure 2**

**NOTICE:** If exterior sidewall building materials are subject to degradation from flue gases or moisture, a minimum 12" diameter shield made from stainless steel or high density plastic shall be used for protection.

2. The PVC vent termination elbow must be installed in accord with local codes and these instructions. The bottom edge of the vent termination elbow must be installed at least 12 in. above the outlet of the combustion air intake termination elbow and must be installed in the same atmospheric pressure zone (i.e. on the same wall). It is recommended that the horizontal distance between the inlet and flue termination be kept to a minimum when possible and not exceed 24 in. apart. The vent and air intake should utilize the same numbers of elbows and approximately the same length of straight pipe to reach the outside termination elbows. (See Figures 2 & 3).

**All installations and services must be performed by qualified service personnel.**

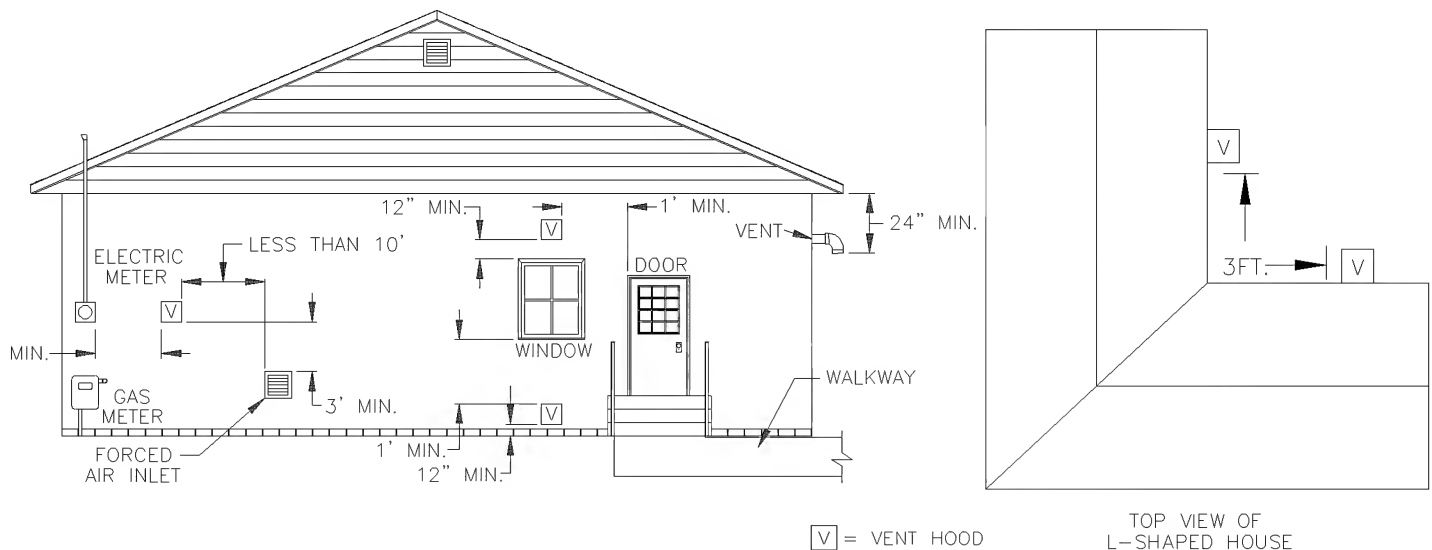


**Figure 3**

### **3. VENT TERMINAL LOCATION REQUIREMENTS**

- a. The vent terminal shall be located at least 3 ft. above any forced air inlet located within 10 ft.
- b. The terminal shall be at least 1 ft. below, 1 ft. horizontally from or 1 foot above any door, window or gravity air inlet into any building. The bottom of the vent terminal shall be located at least 18 in. above grade.
- c. The terminal shall not be located over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief valves or other equipment.
- d. A minimum horizontal clearance of 4 ft. must be maintained from electric meters, gas meters, regulators and relief equipment. The vent terminal shall not be installed over these or any other equipment where condensate or vapor could be detrimental to the operation of this equipment and/or controls.
- e. The unit shall be located so a minimum of 1/4" per foot upward slope can be maintained from the furnace to the terminal outlet and 1/4" per foot downward slope for the last horizontal run of inlet, to the outside inlet terminal.
- f. The vent discharge must be installed a minimum of 12" above grade, 14" from any obstruction and three feet from an inside corner of an L-shaped structure.

**All installations and services must be performed by qualified service personnel.**



**Figure 4**

**⚠CAUTION:** *The vent and air intake elbows must be kept away from bushes, shrubs or any vegetation that may restrict the flow of flue products. It must also be kept clear of any leaves, weeds or other combustible materials. Keep the vent hood clear of snow. Avoid locating the terminals in areas where standing water or condensate drippage may be a problem.*

### **VENT TERMINAL LOCATION GUIDELINES**

In addition to following the requirements outlined by local codes, utilizing the guidelines below when possible in locating the vent terminal will help insure the trouble-free operation of your horizontally vented furnace:

- Avoid locating the vent terminal on a wall facing the prevailing winds and wide open areas.
- When this is not practical, choose locations that protect the vent from strong winds such as behind a fence or hedge. **NOTICE:** The vent terminal must be located a sufficient distance from bushes, shrubs, and vegetation so as not to have the flue products restricted or blocked from such vegetation.
- In areas with considerable snowfall, it is advisable to locate the vent terminal higher than the minimum 12 in. above the ground as to prevent blockage by snow accumulation or drifting.

Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. The life of the furnace could be reduced should acid compounds form within your furnace.

**NOTICE:** Heat exchanger failure caused from contaminated air will void its limited lifetime warranty.

**NOTICE:** The vent termination and air inlet elbow shall be checked periodically, at least at the start of each heating season, for restriction or blockage from foreign material in the vent pipe or in the air inlet. The air inlet and vent pipe should be cleaned when necessary.



**All installations and services must be performed by qualified service personnel.**

## **E1. SINGLE PIPE (SIDEWALL) VENTING OPTION**

This furnace may be **horizontally vented** with a single exhaust pipe. This will be a non-direct vent installation. The same exhaust venting guidelines apply except the exhaust termination will be similar to the air intake of the "2 pipe" direct vent installation. Refer to intake terminal instructions Figure 3 and Figure 5. Termination will consist of one 90° elbow pointed downward.

## **F. INSTALLATION OF OUTSIDE VENT/AIR INTAKE TERMINATIONS**

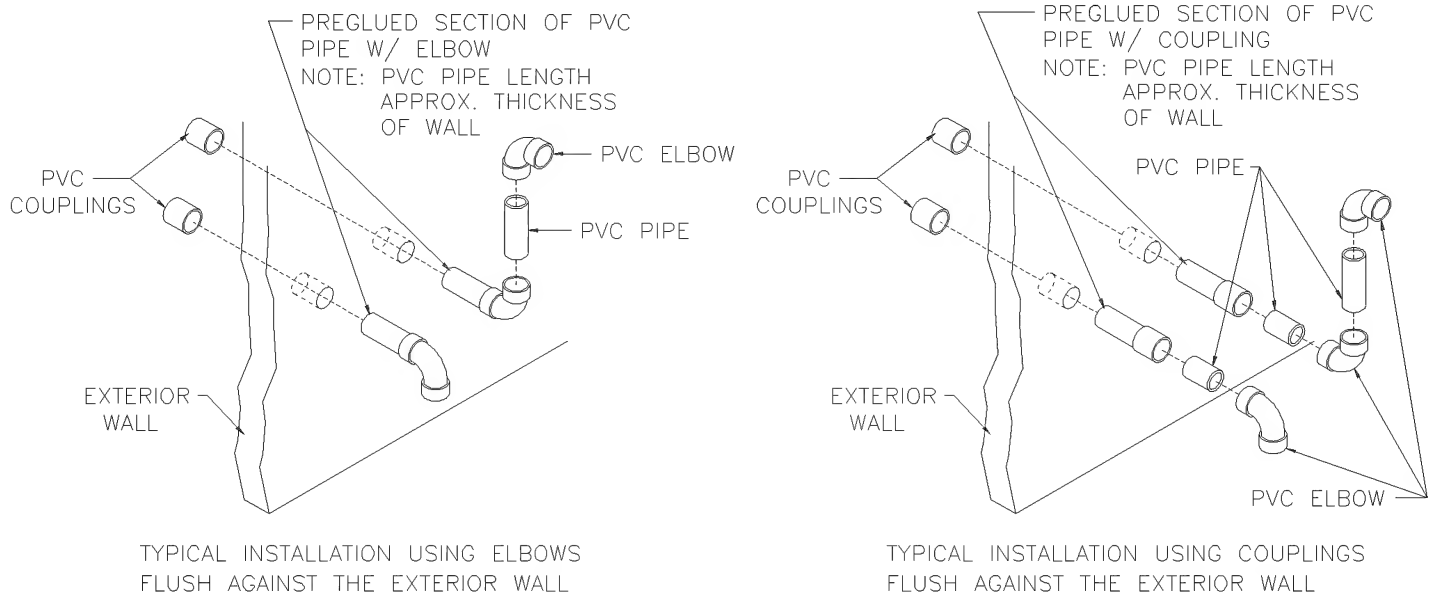
**NOTICE:** Installation of the outside exhaust and combustion air vents must be performed by a qualified installer or service person in accord with local codes, the National Fuel Gas Code NFPA 54, ANSI Z223.1 (Latest Edition) and the sections on venting in this manual.

An optional concentric vent kit is available under part no. 370171. This kit allows the vent and intake to be installed through one 4.5 inch diameter hole. The location and clearances are identical to the requirements of the standard vent termination. This vent kit may be used on any size of the CHB/CDB furnace series.

1. Observing all clearances specified in this manual, cut two 2-3/8" diameter holes in the outside wall for CHB/CDB-50 and 75 and two 3-1/2" diameter holes for the CHB/CDB-100 and 125.
2. Cut two 2" diameter PVC pipes 1-1/2" longer than the depth of the wall. This allows for 3/4" connection on both ends of the pipe. (For 3" PVC pipe, leave 3" for connection). Using PVC pipe cement, cement a PVC elbow or coupler to one end of each pipe.

Mark the pipe before inserting into the wall so the elbow orientation can be determined. Also, if a protective shield will be used on the exterior surface of the wall, it should be installed at this time. Glue a coupling or elbow to each pipe, depending on your installation with the PVC pipe cement being careful to maintain the proper orientation of the elbows. Complete the assembly of the outlet and inlet as shown in Figure 5, making sure that the spacing between the inlet and outlet complies with that shown in Figure 3.

**All installations and services must be performed by qualified service personnel.**



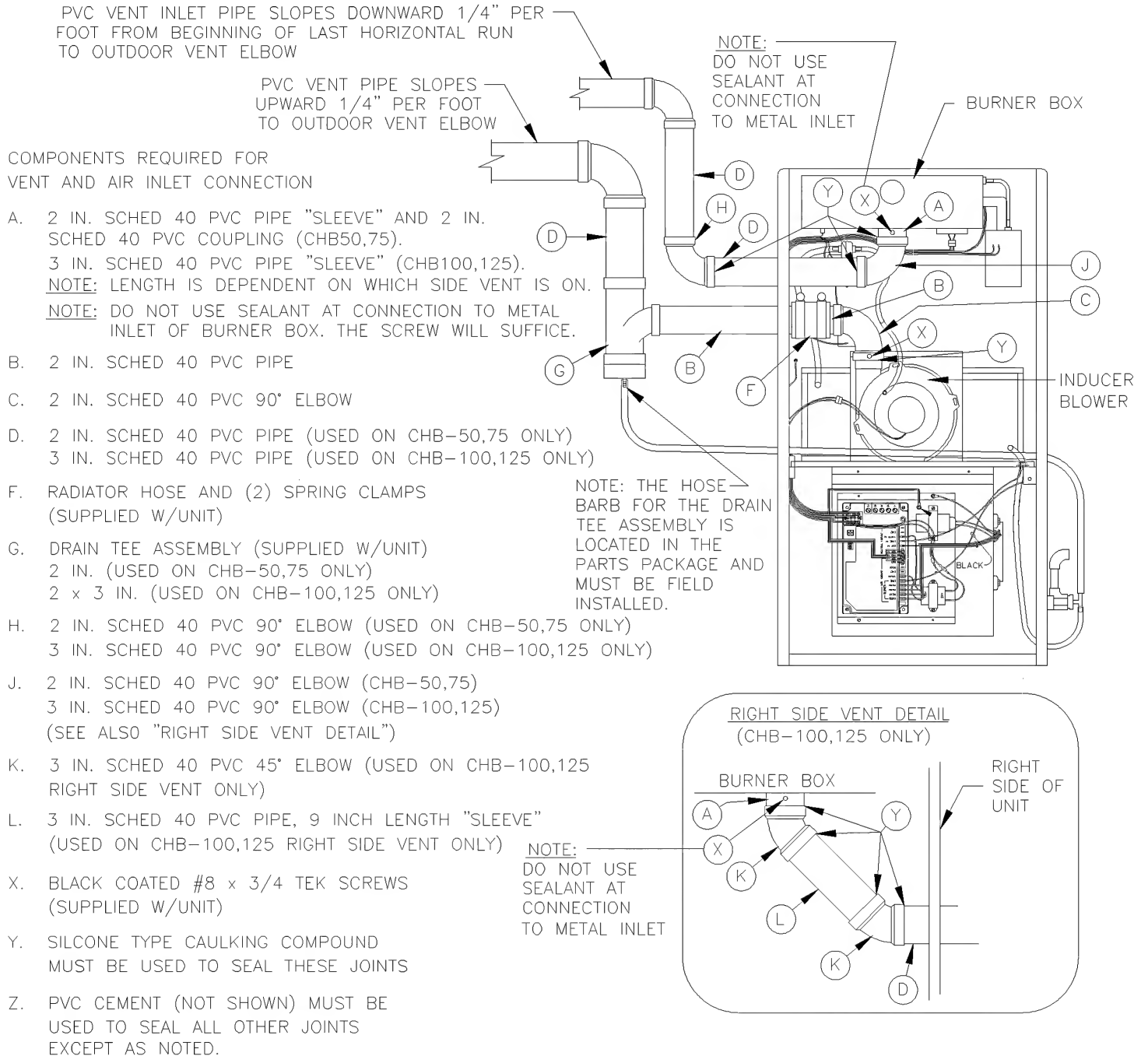
**Figure 5**

2. Finish the vent installation by caulking around the two holes where the PVC pipes pass through the wall.
3. An optional vent or intake terminal (stainless steel) screen is available under part no. 320226.

## **G. CONNECTING FURNACE TO THE VENT/AIR INTAKE TERMINATION AND DRAIN**

**All installations and services must be performed by qualified service personnel.**

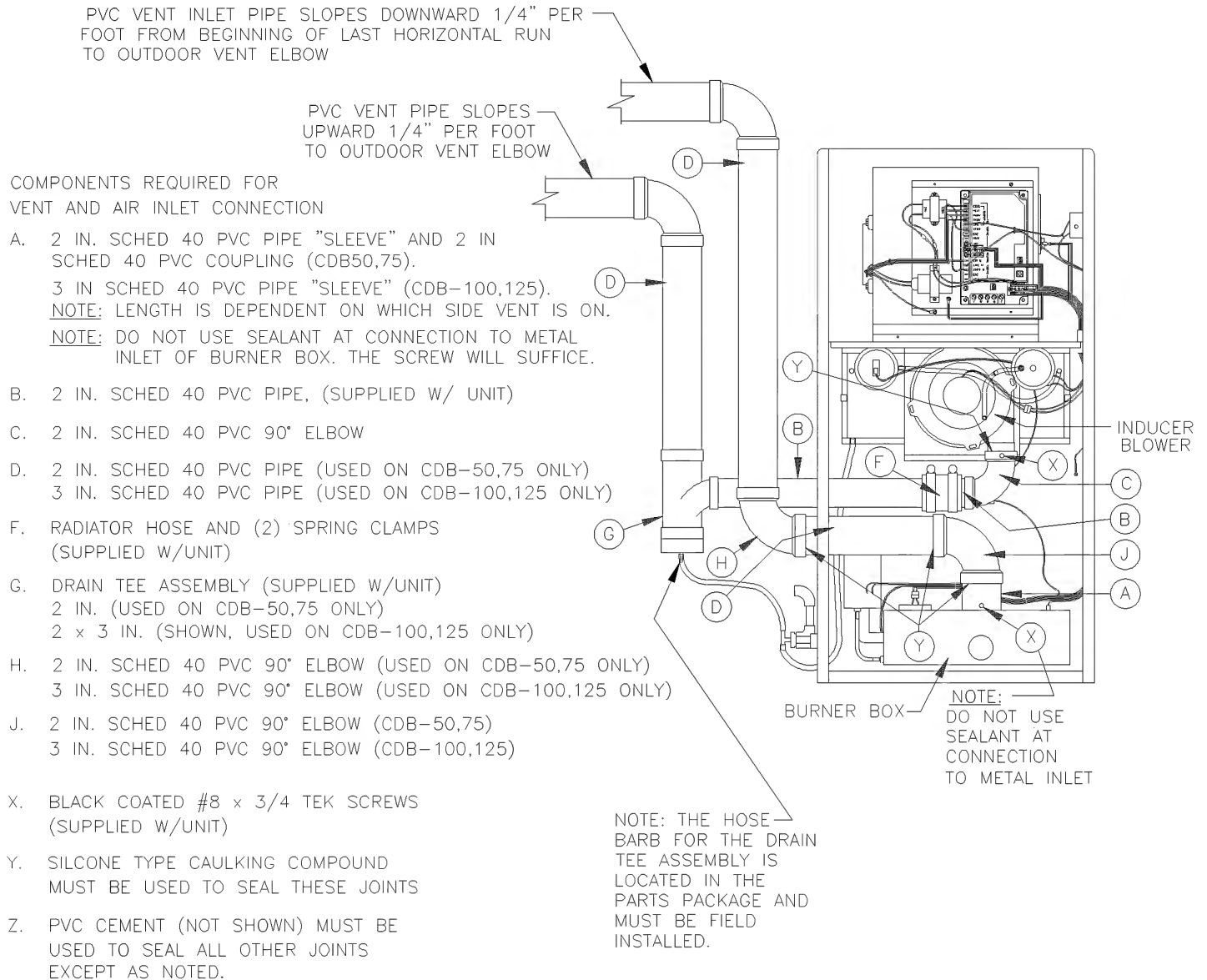
- The following diagrams show the typical vent and air inlet connection for a CHB and CDB furnace as well as a list of the parts that will be needed to install each.



BASIC VENT CONNECTION (CHB SERIES)

**Figure 6**

**All installations and services must be performed by qualified service personnel.**



BASIC VENT CONNECTION (CDB SERIES)

**Figure 7**

**All installations and services must be performed by qualified service personnel.**

COMPONENTS REQUIRED FOR  
VENT AND AIR INLET CONNECTION

- A. 2 IN. SCHED 40 PVC PIPE "SLEEVE" AND 2 IN SCHED 40 PVC COUPLING (CDB-50,75).  
3 IN SCHED 40 PVC PIPE "SLEEVE" (CDB-100,125).  
NOTE: LENGTH IS DEPENDENT ON WHICH SIDE VENT IS ON.  
NOTE: DO NOT USE SEALANT AT CONNECTION TO METAL INLET OF BURNER BOX. THE SCREW WILL SUFFICE.

- B. 2 IN. SCHED 40 PVC PIPE (SUPPLIED W/ UNIT)  
D. 2 IN. SCHED 40 PVC PIPE (USED ON CDB-50,75 ONLY)  
3 IN. SCHED 40 PVC PIPE (USED ON CDB-100,125 ONLY)

- E. 2 IN. X 3 IN. PVC REDUCER (SUPPLIED W/UNIT)  
(USED ON CDB-100,125 ONLY)

- F. RADIATOR HOSE AND (2) SPRING CLAMPS  
(SUPPLIED W/UNIT)

- G. 2 IN. DRAIN TEE ASSEMBLY (SUPPLIED W/UNIT)

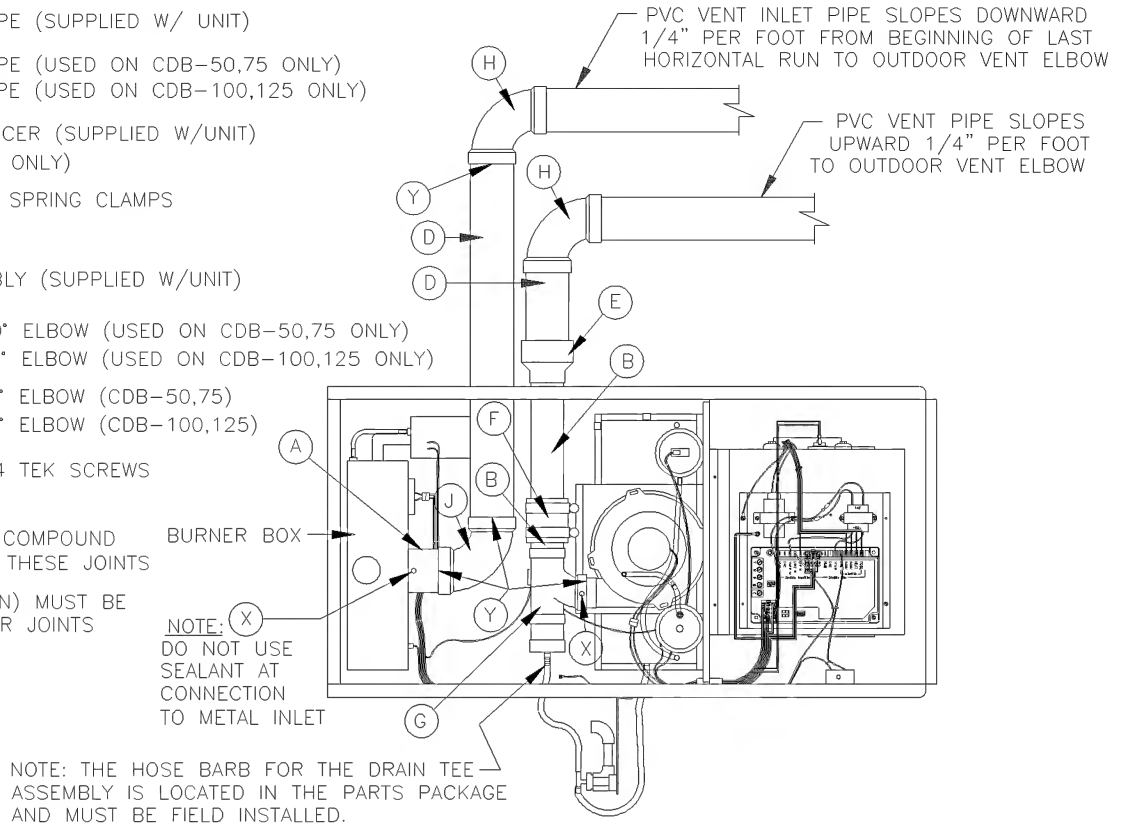
- H. 2 IN. SCHED 40 PVC 90° ELBOW (USED ON CDB-50,75 ONLY)  
3 IN. SCHED 40 PVC 90° ELBOW (USED ON CDB-100,125 ONLY)

- J. 2 IN. SCHED 40 PVC 90° ELBOW (CDB-50,75)  
3 IN. SCHED 40 PVC 90° ELBOW (CDB-100,125)

- X. BLACK COATED #8 x 3/4 TEK SCREWS  
(SUPPLIED W/UNIT)

- Y. SILCONE TYPE CAULKING COMPOUND  
MUST BE USED TO SEAL THESE JOINTS

- Z. PVC CEMENT (NOT SHOWN) MUST BE  
USED TO SEAL ALL OTHER JOINTS  
EXCEPT AS NOTED.



BASIC VENT CONNECTION

(CDB SERIES SHOWN IN A RIGHT SIDE HORIZONTAL APPLICATION)

**Figure 7A.**

**2. CONNECTING THE EXHAUST VENT TO THE INDUCER**

a. Insert the end of the 2" dia. PVC elbow (2" dia. PVC tee assembly for CDB horizontal installations) onto the outlet of the inducer blower assembly. Measure the length of 2" dia. PVC pipe needed to clear the furnace side casing, while allowing for the 2-3/8" rubber radiator hose to be installed within the casing of the furnace. Cut the 2" dia. PVC measured lengths and be sure to allow sufficient length of pipe for connections. Refer to Figures 8A, 8B and 8C.

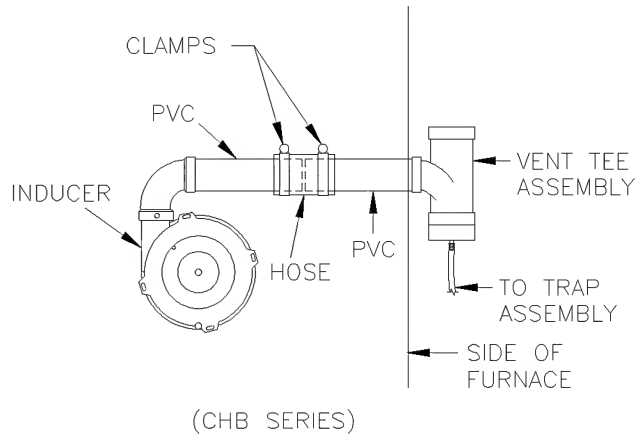
**NOTE:** For CDB series units, a length of 2" dia. PVC pipe and a 2" dia PVC tee assembly are supplied with the unit. For the CDB-100 and CDB-125 units, a 2" x 3" dia. PVC reducer is also supplied.

**IMPORTANT:** Horizontal installations of CDB-100 and CDB-125 units must utilize the 2" x 3" dia. PVC reducer as soon as the vent inlet exits the side casing of the unit. The CDB-100 and CDB-125 series units must be vented with 3" dia. PVC. Refer to Figure 7A.

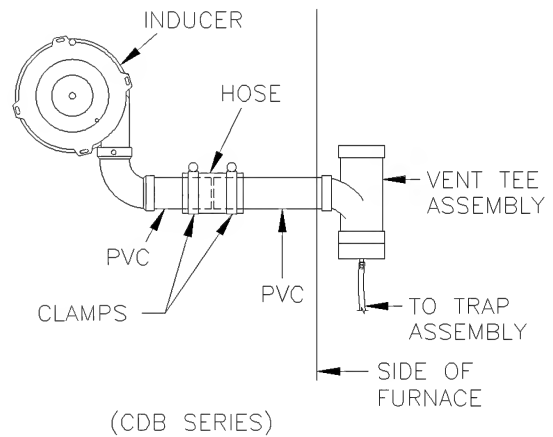
**All installations and services must be performed by qualified service personnel.**

b. After preparation of the 2" PVC pipe, use RTV silicone sealant on the 2" dia. PVC elbow (2" dia. PVC tee for CDB horizontal applications) before inserting it onto the outlet of the inducer. Install a black coated #8x3/4" sheet metal screw through the elbow and on the outlet flange of the inducer to secure the elbow in place.

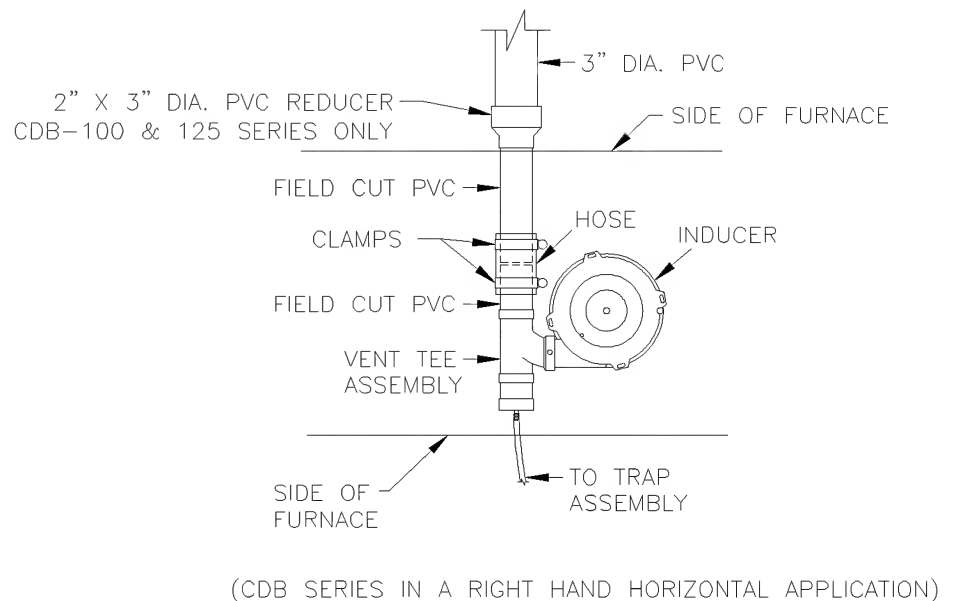
**Figure 8A.**



**Figure 8B.**



**Figure 8C.**



**All installations and services must be performed by qualified service personnel.**

c. PVC cement the pre-cut 2" dia. PVC from step a. to the 2" dia. PVC elbow (2" dia. PVC tee for CDB horizontal applications). Attach to the drain tee assembly using the radiator hose and the 2 clamps(supplied).

**NOTICE:** The exhaust vent piping must slope upward at least 1/4" per foot from the furnace to outdoor vent terminal. The inlet vent piping must slope downward at least 1/4" per foot from the beginning of the last horizontal run of pipe to the outdoor vent terminal. The PVC pipe must be supported directly over the vent tee assembly (CDB) or (CHB), every four feet thereafter and at every joint. After making sure the slope and length of the piping are correct, glue the furnace tee and vent terminal connections in place.

### 3. CONNECTING THE COMBUSTION AIR INLET

a. Install a 2" PVC elbow with sleeve and coupling (CHB/CDB-50,75 series) or 3" PVC elbow with sleeve (CHB/CDB-100,125 series) on the inlet of the burner box. Using a tape measure, measure the length of 2" or 3" PVC pipe needed to clear the casing. Be sure to allow sufficient length for insertion to the elbow at the burner box and the elbow or coupling on the end. Cut the 2" or 3" PVC to the measured length.

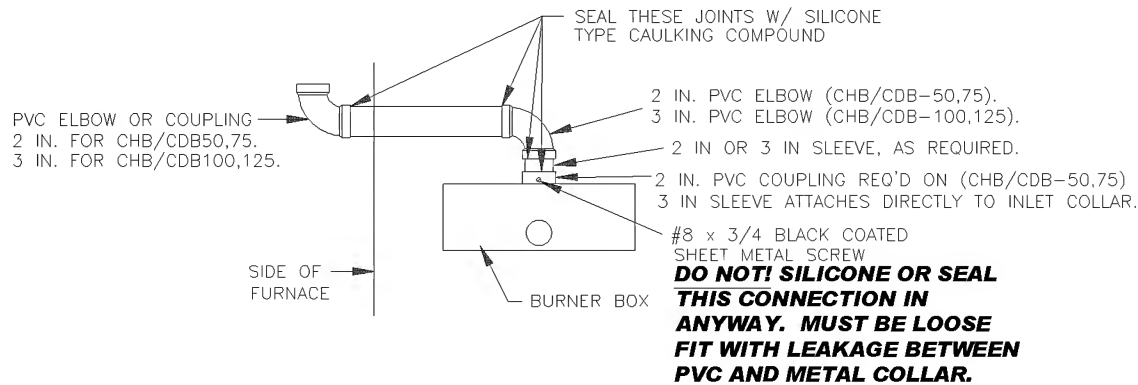
b. After preparation of the PVC pipe, secure the coupling or sleeve in place using a black coated #8x3/4 sheet metal screw through the PVC into the metal collar of the burner box.

**Note:** The PVC connection to the metal burner box collar does not require RTV silicone sealant or PVC cement. Attach the PVC elbow to the sleeve and then to the coupling where required, using RTV silicone sealant. (see Figure 10).

c. Install the precut 2" or 3" PVC pipe into the elbow at the burner box and to the elbow or coupler just outside the furnace using RTV silicone sealant. To make these seals, run a bead of high temperature RTV silicone sealant around the PVC pipe 3/8" from either end, insert into the appropriate couplings and elbows and rotate 1/4" turn. This will allow for easy disconnection in case the burner assembly must be removed at a later date. (see Figure 10).

**Note:** When applying silicone sealant, ensure that no excess sealant is pushed into the vent opening. This may cause flow restriction within the vent.

**All installations and services must be performed by qualified service personnel.**



**Figure 10**

**NOTICE:** The air intake pipe must be supported every 4 feet. After making sure the length of the piping is correct, glue all connections in place except the length of pipe between the combustion air fitting on the burner box and the first fitting.

If the combustion air piping is installed in a warm humid place, such as a laundry room or above a suspended ceiling, it must be insulated with a 1.0" foil faced insulation or its equivalent.

If the vent piping is run through an unconditioned space, it must be insulated with a 1.0" foil faced insulation or its equivalent.

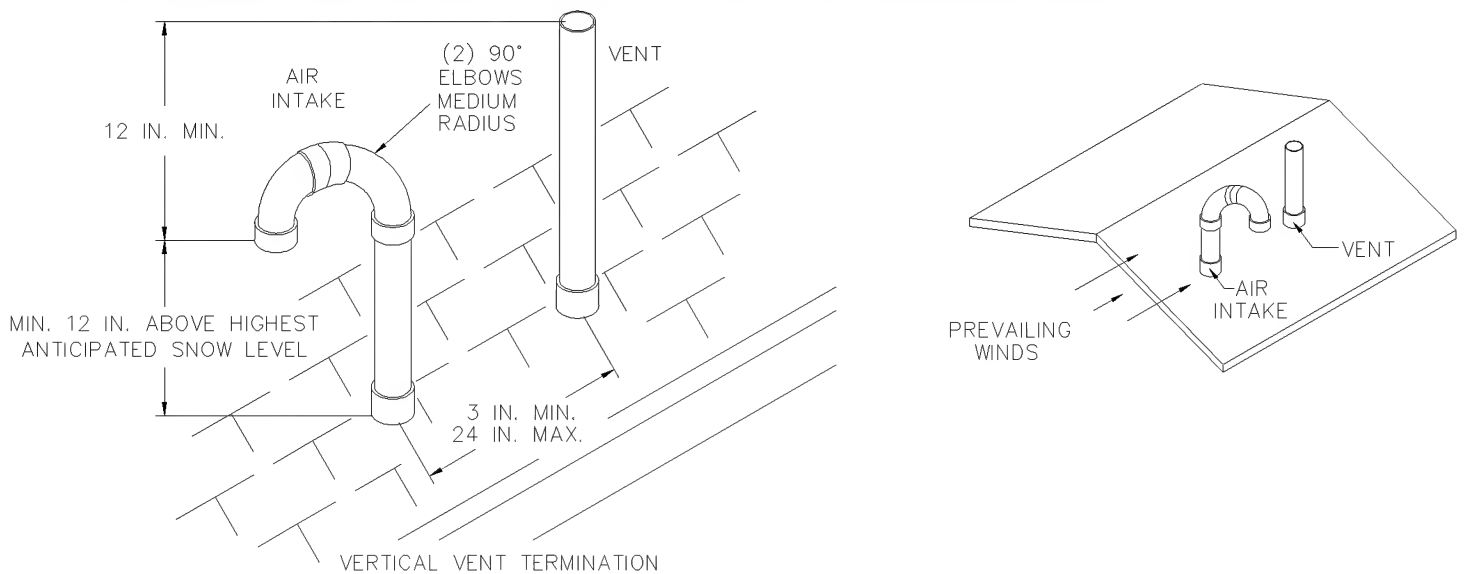
**⚠CAUTION:** *Outside combustion air must not come from an area that is directly adjacent to a pool, hot tub or spa. Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. Should acid compounds form in your furnace, it may reduce the life of the furnace.*

## **H. CONNECTING THE FURNACE TO ROOF VENT/AIR TERMINATIONS**

The furnace may be vented vertically through the roof if it is not possible to vent the furnaces through the sidewall.. The outlet/inlet of the vent and air intake terminations shall be a minimum of 12 inches above highest anticipated snow level. The vent outlet must be installed a minimum of 12 in. above the air intake inlet. The combustion air intake shall be installed upwind of the vent outlet when exposed to prevailing winds. The exhaust vent and combustion air intake can be a minimum of 3 in. and a max. of 24 in. apart (see Figure 11). **NOTE:** When the vent termination is installed correctly, no draft should be present in the system during the furnace off cycle.



**All installations and services must be performed by qualified service personnel.**

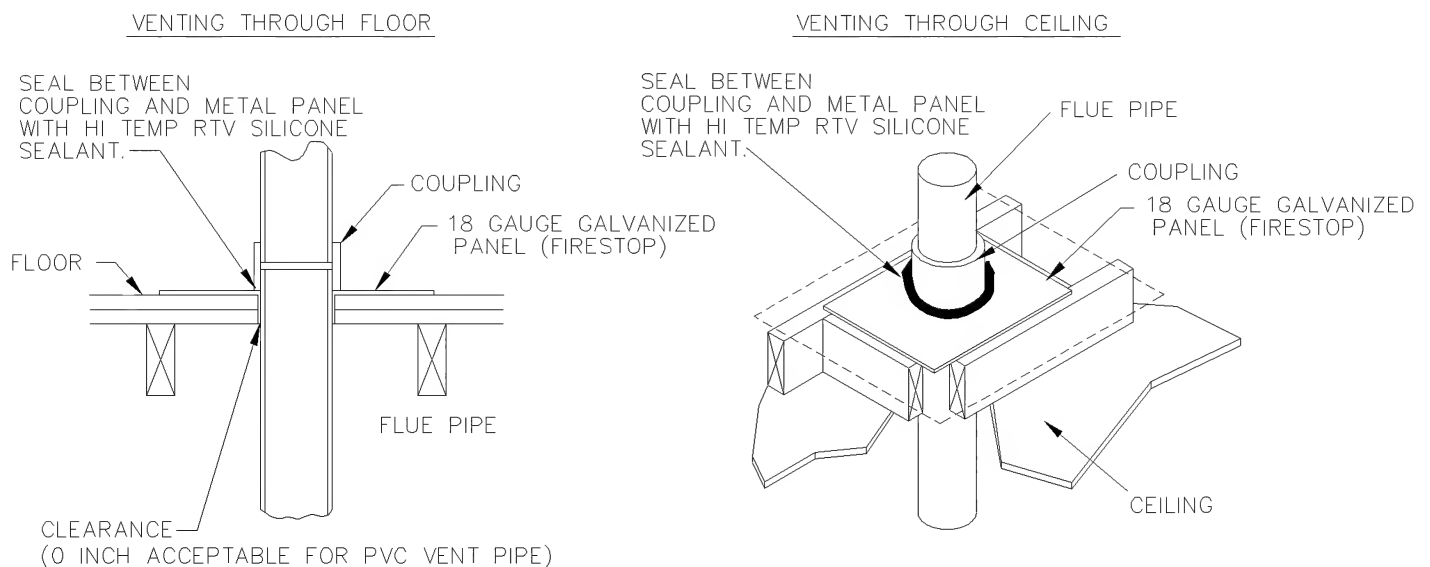


**Figure 11**

When the PVC vent and combustion air intake pipes must pass through a floor or ceiling, the following must be followed:

**CEILING:** Frame out area around where PVC pipe is to penetrate ceiling. Cut a 2-3/8" diameter hole for 2" PVC and a 3-1/2" diameter hole for 3" PVC in the ceiling and a corresponding hole in a firestop to be made of a minimum of 18 gauge galvanized metal large enough to cover the entire framed area. Cut PVC pipe so that it extends up past the fire stop far enough to engage a PVC coupling that will rest on the fire stop and act as a support. Seal between the pipe coupling and fire stop with high temperature RTV silicone sealant (see Figure 12). Continue installing PVC pipe to exhaust vent and combustion air intake termination as described previously.

**FLOOR:** Follow same instructions as ceiling penetration, except the area around where the pipe passes through the floor does not have to be framed in. (see Figure 12).



**Figure 12**

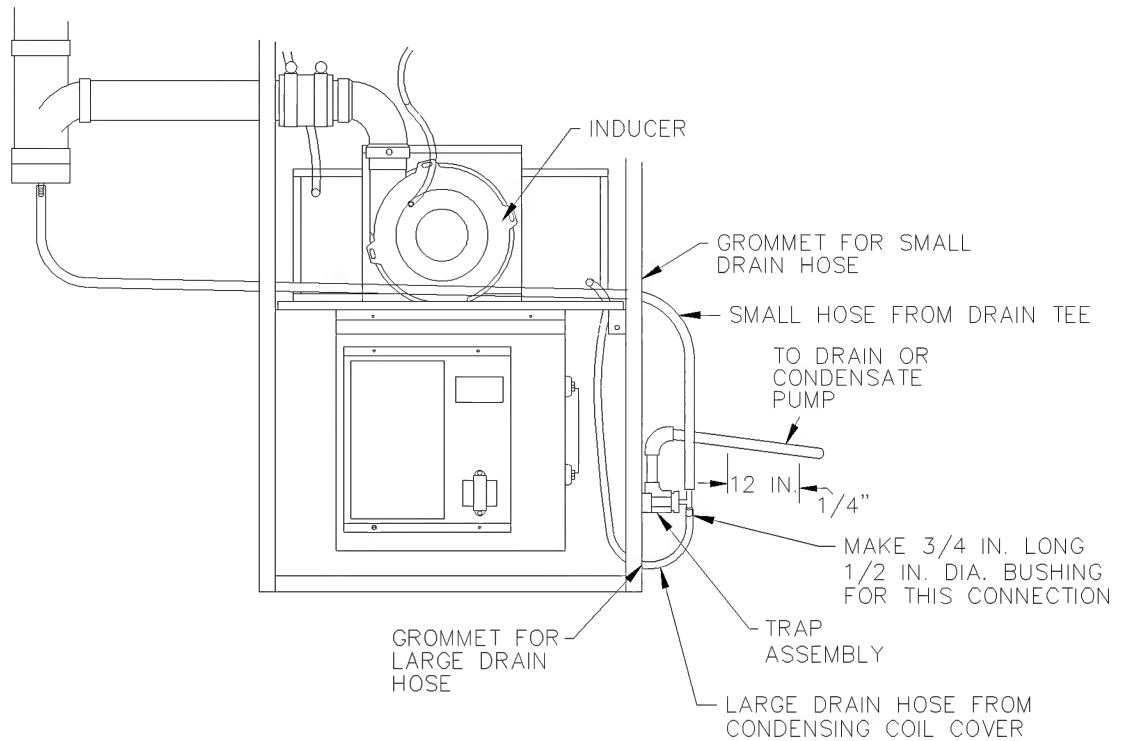
All installations and services must be performed by qualified service personnel.

## I. CONDENSATE DRAIN LINE AND TRAP ASSEMBLY

1. The following diagrams show the typical drain and trap connection for a CHB and CDB furnace.

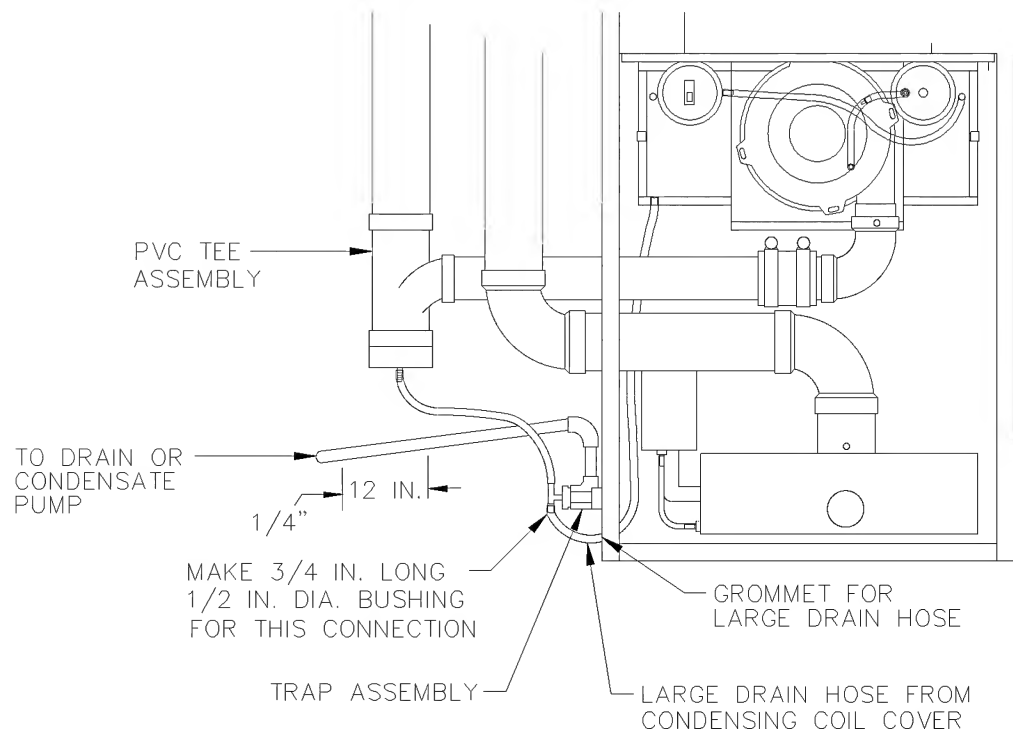
### TRAP ASSEMBLY MOUNTED ON CHB

Figure 13



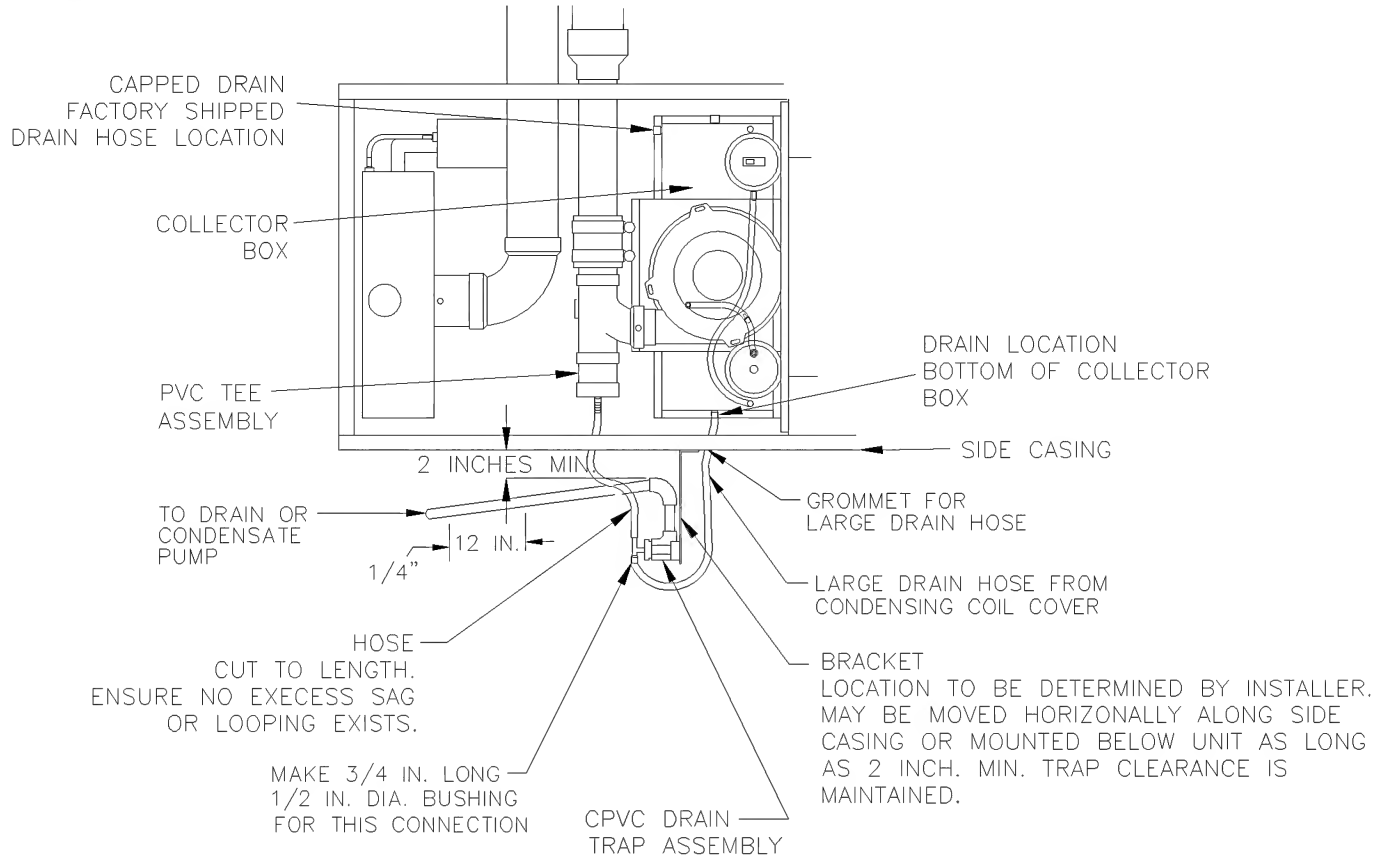
### TRAP ASSEMBLY MOUNTED ON CDB

Figure 14



**All installations and services must be performed by qualified service personnel.**

## **TRAP ASSEMBLY MOUNTED ON CDB RIGHT SIDE HORIZONTAL INSTALLATION**



**Figure 14A**

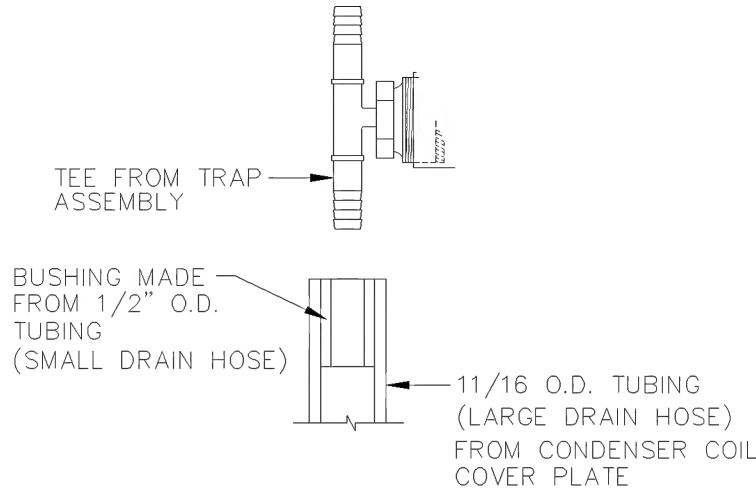
2. Determine on which side of furnace the condensate disposal line is to be run (NOTICE: On CHB/CDB's this must be the same side as the flue outlet or bottom of unit). Attach the condensate trap to the furnace casing using the #8x3/4" sheet metal screws provided in the parts package. Pilot holes are provided on both sides of the casing for mounting.

**NOTE:** When the CDB series unit is used in a horizontal application, the drain hose from the collector box will require a location change from its factory shipped connection. A knockout has been provided in the unit side casing for the drain hose to exit. The connection change can be accomplished as follows: Refer to Figure 14A.

- a) Locate and disconnect the drain hose at the collector box from its factory shipped connection location.
- b) Locate and uncap the drain at the bottom (as it is oriented) of the collector box.
- c) Connect the drain hose from **step a** to the uncapped bottom drain from **step b**.
- d) Cap the previous drain connection from **step a** with the existing cap removed in **step b**.

**All installations and services must be performed by qualified service personnel.**

3. Attach the large drain hose (11/16" diameter clear tubing) from the front (CHB) or bottom (CDB) of the condensing coil cover plate to one side of the PVC tee provided in the trap assembly. A small bushing will have to be made from a 3/4" long piece of small drain hose (1/2" o.d. clear tubing) to install the large drain hose (11/16" o.d. tubing) onto the tee of the trap (see Figure 15). Secure the large drain hose (11/16" o.d. tubing) with the silver clamp provided in the parts package. Be careful to route the tubing through the proper hole in the furnace casing using the Heyco bushing provided. While making all connections with the clear tubing, be careful to route the tubing in a manner to prevent kinking or abrasion of the tubing.



**Figure 15**

4. Measure the small drain hose (1/2" o.d. clear tubing) provided and remove any extra length, making sure that the hose has sufficient length not to kink or otherwise be restricted once installed. Attach the small drain hose (1/2" o.d. clear tubing) to the other side of the condensate trap tee. On CHB/CDB's, this hose is shipped in the parts package and it will be necessary to attach the other end to the PVC drain tee assembly (see Figure 14). Use the red clamp(s) provided in the parts package to secure all connections.
5. Install field supplied 1/2" PVC drain pipe and elbows using PVC cement to reach a nearby drain. A minimum 1/4" per foot downward slope toward the drain must be maintained. The drain line must be water tight, supported and secured so that it can't be moved. The length of the drain must be kept as short as possible.

**IMPORTANT:** If an air conditioning condensate drain line is combined with the furnace condensate drain line, it must have a separate trap ahead of the joint connection.

6. If a drain is not readily available or is above the trap outlet level on the furnace or the drain line cannot be sloped downward its full length to the drain, then a condensate pump (part #350225) can be ordered from the factory. Follow the pump manufacturers installation instructions.

**All installations and services must be performed by qualified service personnel.**

7. The furnace condensate is slightly acidic with a pH of 3.5. Cola drinks with a pH of 3.1 are actually more acidic. If local codes require a neutralizing kit, the kit may be ordered using part no. 320095. Instructions included with the neutralizing kit must be followed for its proper installation.

8. The condensate piping in the furnace and the drain system must be flushed out at the start of every heating season. This will assure trouble free operation and will keep the acidity level well above 3.4 pH.

To flush the condensate drain system, turn off power to the furnace at the electrical disconnect switch and turn the thermostat to the lowest setting.

Remove the 11/16" diameter clear tubing from the coil drain nipple and run tap water into the open end of the tubing. This should keep the drain system clean. Replace the tubing by pushing it firmly onto the nipple. Make sure the spring clamp is returned to the original position to prevent leaks. If any of the electrical controls are exposed to water, dry with a soft cloth and wait 24 hours before operating the furnace. Set the room thermostat to the desired temperature and restore electrical power to the furnace.

## **J. GENERAL GAS PIPING**

***⚠WARNING: Because of the potential of odorant fade, a gas leak may not be detected by smell. If this furnace is installed below grade, contact your gas supplier for a gas detector.***

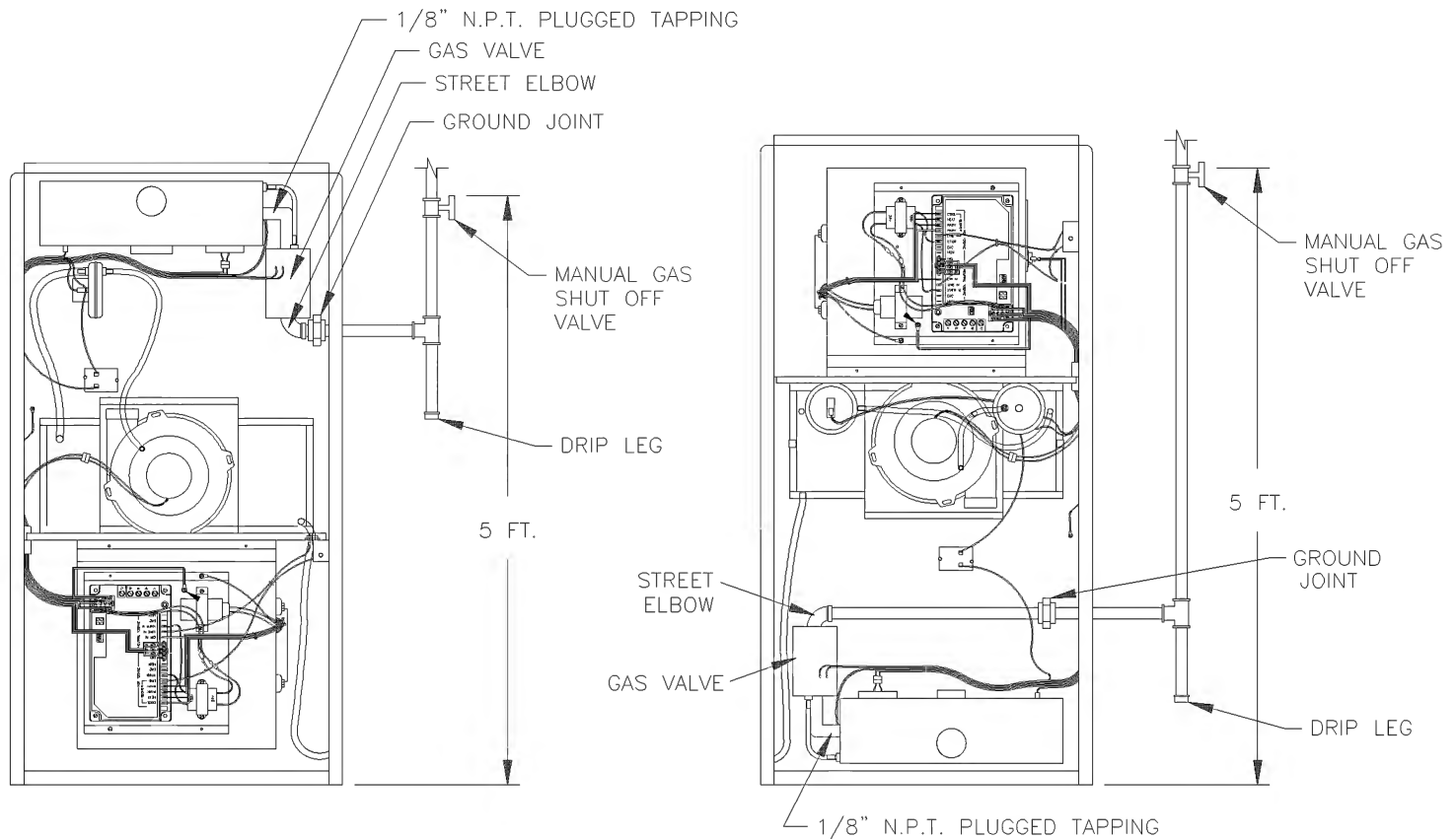
All gas piping and testing must be performed by a qualified installer or service person. The installation must comply with local codes, these instructions and The National Fuel Gas Code NFPA54/ANSI Z223.1-LATEST EDITION.

Piping from the natural gas meter to the furnace shall be in accordance with requirements of the local utility. Piping from the LP tank to the furnace must follow the recommendations of the gas supplier.

1. A readily accessible, certified manual shut off valve with a non-displaceable rotor member shall be installed within six feet of the gas equipment it serves. A union or flanged connection shall be provided downstream from the manual valve to permit removal of controls. A 1/8" N.P.T. plugged tapping is provided in the manifold adjacent to the burner box for connection of a test gage to check gas supply pressure to the furnace. Unions must be of a ground joint type or flanged-jointed using a gasket resistant to LPG. Pipe dope or sealant certified to be resistant to the action of liquefied petroleum gases shall be used on all threaded joints. If the 1/8" in. NPT plugged tapping on the inlet of the gas valve is not accessible for an installation, a 1/8" in. NPT plugged tapping, accessible for a test gauge connection must be installed immediately upstream of the gas supply connection to the furnace.

**All installations and services must be performed by qualified service personnel.**

2. Left and right gas supply piping - These furnaces are set-up to be gas piped through either the left or right side by using a street elbow and a straight pipe. For the purposes of service, it is recommended that the gas union be located inside the furnace, when possible.



**Figure 16**

3. A drip leg must be used on both LP and natural gas installations prior to the furnace in order to trap oil, condensate and other impurities which might otherwise lodge in the gas valve or plug the burner orifice. A drip leg shall be provided at the outlet of the gas meter when there is excessive condensation between the gas meter and the furnace. Failure to install a drip leg may void the limited warranty on the furnace.

**⚠WARNING:** All gas piping must be leak tested using a soap and water solution (when the gas is turned on) following the procedure outlined in Section IV, J, of this manual. A final test for gas leakage must be made after purging the gas line (refer to Section V, B, of this manual). This test must be conducted with the unit operating and should include the furnace piping and gas valve. Never use an open flame to check for a gas leak.

**⚠CAUTION:** Care must be taken not to wet electronic components during leak test. Wetting the primary ignition module may damage its circuitry and cause a hazardous situation. Dry moisture from all leads and terminals if wetting occurs. Wait at least 24 hours for the circuit to fully dry before energizing the burner circuit.

All installations and services must be performed by qualified service personnel.

**⚠WARNING:** *The furnace and its individual gas shutoff valve must be disconnected from the gas supply during pressure testing of the gas supply system at pressures in excess of 1/2 PSIG or 14.0" wc. The furnace must be isolated from the gas supply by closing its manual shut off valve at test pressures equal to or less than 1/2 PSIG or 14.0" w.c.*

## K. INSTALLATION OF NATURAL GAS PIPING

The installation of the gas piping and the following test procedures must be performed by a qualified installer or service person.

1. The following chart is to be used as a guide in sizing natural gas supply piping. The input loading of all gas appliances installed on any main or trunk line must be totaled to determine its needed carrying capacity. **EXAMPLE:** A line must supply a furnace of 100,000 BTU/hr input, a hot water heater of 40,000 BTU/hr input and gas range with a 30,000 BTU/hr input capacity. The total BTU/hr input loading on the line is 170,000 BTU/hr. The 200,000 BTU/hr column on the chart must be used in sizing the pipe.

**- STEEL PIPE SIZE FOR NATURAL GAS -**

BURNER FIRING RATE, BTU/HR	FEET OF PIPE FROM METER TO BURNER				
	10'	20'	30'	40'	50'
50,000	1/2	1/2	3/4	3/4	3/4
100,000	3/4	3/4	3/4	3/4	1
150,000	3/4	1	1	1	1-1/4
200,000	1	1	1-1/4	1-1/4	1-1/4
250,000	1	1	1-1/4	1-1/4	1-1/4
300,000	1	1	1-1/4	1-1/4	1-1/4

**TABLE 3**

Use black iron steel pipe and malleable iron fittings for Natural gas service lines. Provide rigid supports for the pipe. Use reducing couplings only if the pipe size must be reduced. Avoid the use of reducing bushings. Remove all burrs and inspect the pipe for dirt or other foreign material prior to connecting.

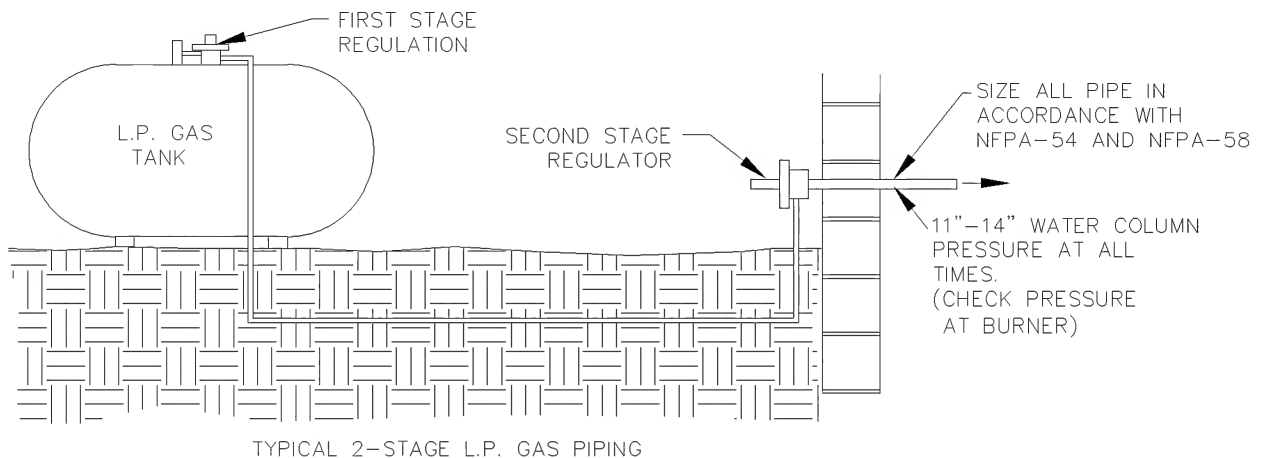
Maximum supply pressure for natural gas is 14" w.c. and minimum supply for purpose of input adjustment is 4-1/2" w.c.

## L. INSTALLATION OF LIQUEFIED PETROLEUM GAS (LP) PIPING

**All installations and services must be performed by qualified service personnel.**

1. Experience has proved that the pressure drop in the gas line running from the outside propane gas tank to the gas appliances in a home is the most frequent cause of equipment malfunctions. A single pressure regulator, located at the tank, will not reliably regulate the high tank pressures (up to 200 lbs.) down to 11" w.c. Varying pressures will occur at the appliances as outside temperatures and usage demands vary. Two stage regulation is the only effective method of controlling these variables. (see Figure 17).

### TYPICAL PIPING FOR TWO STAGE REGULATION



**Figure 17**

**NOTICE:** Two stage regulation must be installed for liquefied petroleum gas when used with any Thermo Pride LP furnace. See illustration above of a typical two stage piping system.

### - COPPER TUBING SIZE FOR LIQUEFIED PETROLEUM GASES -

TABLE I						TABLE II						
IF THE LENGTH OF LINE BETWEEN REGULATORS (TANK TO BUILDING) IS THIS LONG ---						IF LENGTH OF LINE BETWEEN SECOND STAGE REGULATOR AND FURNACE IS THIS LONG ---						
USE THIS SIZE TUBING TO KEEP PRESSURE DROP BELOW 2 LBS. FOR MAXIMUM FLOW SHOWN.	TOTAL INPUT LOAD(BTU) ON LINE	25'	50'	75'	100'	USE THIS TUBING OR PIPE TO KEEP PRESSURE DROP BELOW 1 1/2" WATER COLUMN FOR MAXIMUM FLOW SHOWN.	TOTAL INPUT LOAD(BTU) ON LINE	10'	20'	30'	40'	50'
	125,000	3/8" O.D. COPPER					75,000	5/8" O.D. COPPER				
	250,000	3/8" O.D. COPPER			1/2" O.D. COPPER		125,000	5/8" O.D. COPPER	3/4" BLACK PIPE			
	375,000	1/2" O.D. COPPER					187,500	3/4" BLACK PIPE				
	500,000	1/2" O.D. COPPER					250,000	3/4" BLACK PIPE				
							375,000	3/4" BLACK PIPE	1" BLACK PIPE			
							500,000	1" BLACK PIPE				

All black pipe sizes shown are I.D.

**TABLE 4**



**All installations and services must be performed by qualified service personnel.**

Seamless copper tubing may only be used with gases that are not corrosive to it. See note below and check with your LP gas supplier before using. Seamless copper tubing must comply with standard type K or L for seamless copper water tube, ASTM B 88; or seamless copper tube for air conditioning field service, ASTM B 280. Copper tubing sizes for indicated BTU input rates are given above in Table 4.

***⚠WARNING: Copper and brass tubing and fittings (except tin lined) shall not be used if the gas contains more than a trace (0.3 grains per 100 cubic ft.) of hydrogen sulfide gas. Check with your gas supplier.***

Maximum supply pressure for liquefied petroleum (LP) gas is 14" w.c. and minimum supply for purpose of input adjustment is 11" w.c.

## **M. REQUIREMENTS AND SIZING OF DUCT WORK**

The duct system must be sized and installed by a qualified installer or service person, following the design standards of the Air Conditioning Contractors of America (ACCA) or ASHRAE.

1. When it is located in the same room as the furnace, a return air register must be installed a minimum of 20 feet away from the furnace.
2. The return air duct shall also be sealed to the furnace and also terminate outside of the furnace space, if supply ducts carry circulated air to areas outside the space containing the furnace.
3. The return air duct system must equal the supply air duct system in its capabilities. Use a supplier's catalog for proper sizing of outlet and return air registers and grills to ensure that they meet the CFM requirements of the run to which they are connected.
4. If the furnace is used in connection with an air conditioning evaporator coil, the furnace must be installed parallel with or on the upstream side of the coil, to prevent condensation in the heat exchanger. If the evaporator coil is installed with a parallel flow arrangement, dampers or other means to control flow of air should be installed to prevent chilled air from entering the furnace. If such a device is manually operated, it must be equipped with a means to prevent operation of either the furnace or air conditioner unless it is in the full heat or cool position.

We recommend that the outlet duct be equipped with a removable access panel to allow for visual inspection of the heat exchanger to check for leakage or to allow for insertion of a probe sampler in the air stream. This removable access cover should be attached to ensure there is no air leakage.

5. The duct system shall be sized for the maximum CFM requirement of the installation whether it is for heating or cooling. Two common rules for heating and cooling follow:
  - A. 400 CFM (1200 BTU's) per ton of cooling is required.

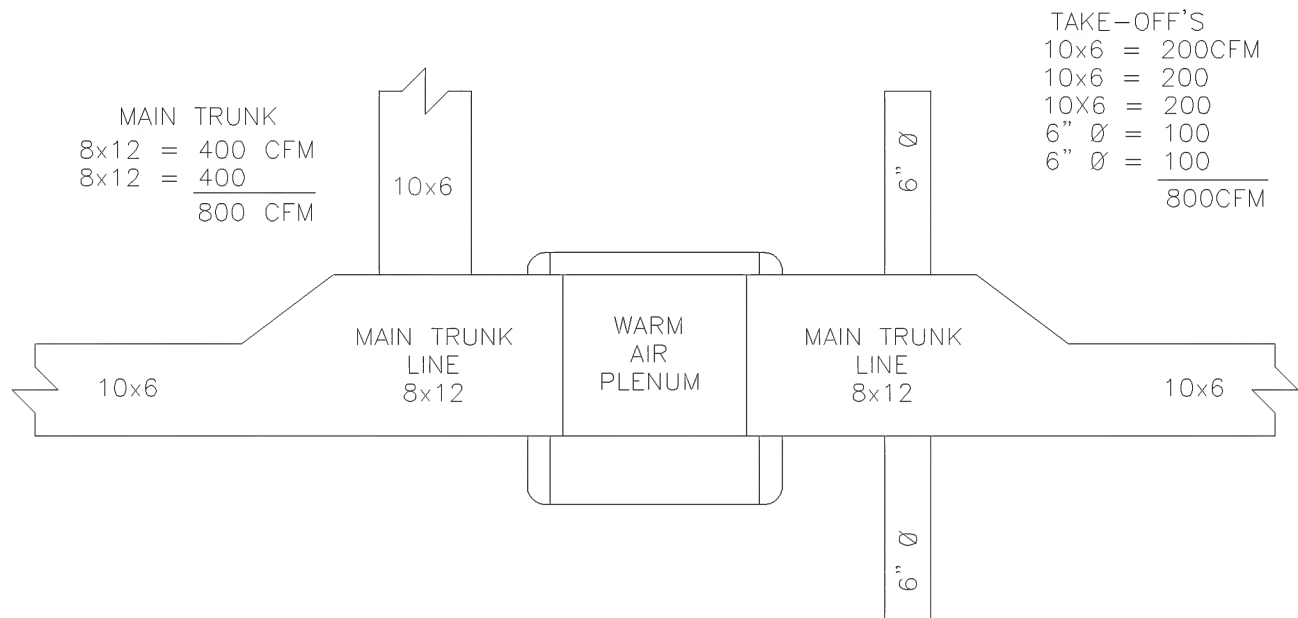
**All installations and services must be performed by qualified service personnel.**

B. 14 CFM of heating per 1000 BTU's of furnace output based on its steady state efficiency and a 55° to 85° temperature rise.

**EXAMPLE:** Heating output of a furnace is 100,000 BTU/HR

$$\frac{100,000 \text{ BTU} \times 14 \text{ cfm}}{1000 \text{ BTU}} = 1400 \text{ CFM}$$

Air conditioning installed is 4 tons x 400 CFM = 1600 CFM or 48,000 BTU's. NOTE: The duct system must be sized for the larger CFM requirement for cooling. If only 3 tons 36,000 BTUs of cooling x 400 CFM = 1200 CFM was installed, the duct would have to be sized for the 1400 Cfm heating requirement.



**Figure 18**

All trunk lines, take-offs, registers and grill-free areas must be figured when determining the air handling capacity of a duct system. One can obtain the necessary duct system size by utilizing the chart below. (For example, see Figure 18.) Use a supplier's catalog for proper sizing of outlet and return air registers to insure that the register will meet the CFM requirements of the run to which it is connected.

The main trunk lines, take offs, registers and grills of the supply return air duct system must have an adequate square inch area to move the desired CFM in order to achieve proper movement. The following chart shows the CFM air handling capability based on a 0.1" SP loss in the supply duct system. The total external static pressure should not exceed .2 inches water column.

**All installations and services must be performed by qualified service personnel.**

### **DUCT SIZES FOR HOMES, QUIET OFFICES, OR SIMILAR INSTALLATIONS**

CFM	DIA.	SQ."	RECTANGULAR DUCT DIMENSIONS ... INCHES							
45	4	12.5								
65	5	19.6								
100	6	28						6x6	9x4	
150	7	38						8x6	12x4	
200	8	50						10x6	14x4	
250	9	63					8x8	12x6	18x4	
300	9	63					10x8	14x6	20x4	
400	10	78					12x8	16x6	25x4	
500	12	113				10x10	14x8	19x6	30x4	
600	12	113				12x10	16x8	22x6	38x4	
700	12	113				14x10	18x8	26x6		
800	14	154			12x12	15x10	20x8	28x6		
900	14	154			14x12	17x10	22x8	32x6		
1000	16	201			15x12	18x10	24x8	34x6		
1100	16	201		14x14	16x12	20x10	26x8	40x6		
1200	16	201		15x14	17x12	22x10	28x8	42x6		
1300	16	201		16x14	18x12	22x10	30x8	46x6		
1400	18	255		16x14	19x12	24x10	32x8	48x6		
1500	18	255		17x14	20x12	26x10	34x8	50x6		
1600	18	255	16x16	18x14	22x12	26x10	36x8	54x6		
1700	18	255	17x16	20x14	22x12	28x10	38x8	58x6		
1800	18	255	18x16	20x14	24x12	30x10	40x8	62x6		
1900	20	314	18x16	22x14	26x12	32x10	44x8	64x6		
2000	20	314	20x16	22x14	26x12	34x10	46x8			
2200	20	314	18x18	20x16	24x16	28x12	36x10	48x8		

**TABLE 5**

Each of the system components (trunk lines, take offs, runs and register and grill-free areas) must be properly sized and matched together to ensure the necessary air handling capacity of a duct system. A 12" x 8" duct with a 400 CFM capacity for example will not flow 400 CFM if the register(s) to which it connects only flow a total of 200 CFM.

The speed of the blower motor may have to be changed to obtain the proper 55°F to 85°F temperature rise for heating when an air conditioning coil is installed. This depends on the static resistance of an individual duct system and the size of the air conditioner.

**All installations and services must be performed by qualified service personnel.**

## **N. FILTERS**

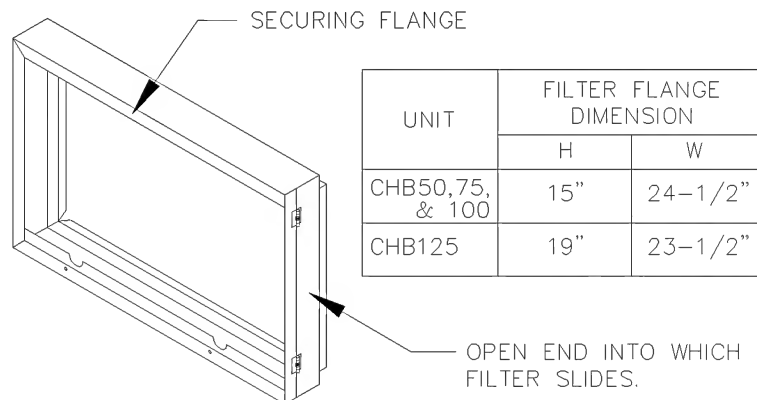
### **1. CHB MODELS: HIGHBOYS**

It is necessary to cut the return air opening in the bottom or side casing depending upon the needs of the specific installation.

**NOTICE:** If your CHB will require air delivery above 1800 CFM, it is advisable that both sides, a combination of 1 side and the bottom, or the bottom only be used for return air. (If a return is cut in the bottom, it should be as large as the return opening in the equivalent CDB model. (see specification sheet in beginning of this manual).

This CHB furnace has been factory supplied with a high quality re-usable filter rated for air velocities up to 600 ft/min. An optional Thermo Products filter rack assembly (part no. AOPS7547 for CHB50 thru 100 and AOPS7375 for CHB-125) is available which is sized for the filter provided.

If an optional Thermo Pride filter rack (figure 19) is used with the furnace, it will serve as a template to scribe a mark for the return air opening on the casing. Place the filter rack on the casing one inch up from the bottom of the furnace and centered from side to side. Place the securing flange against the casing for locating the return air opening.



**Figure 19**

**PLEASE NOTE:** While scribing the return air opening, the filter rack can be held into position by tape or similar means.

Position the open end of the filter rack so that it is accessible for filter replacement. Once the filter rack is positioned correctly, scribe a line along the inside of the securing flange of the filter rack on three of the sides. To scribe a line on the fourth side, on the open end, use the open end support for a guide.

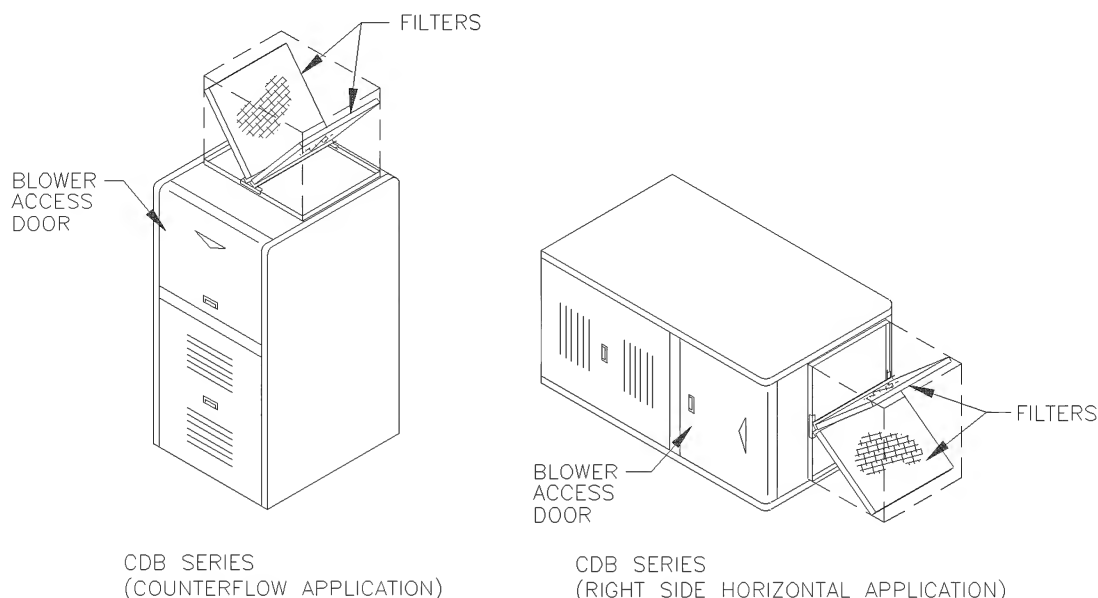
Remove the filter rack and cut the return air opening in the casing. Now the filter rack can be permanently attached to the furnace with screws or pop-rivets along the securing flange.

Connect the return plenum to the filter rack and slide the filter into place.

### **2. CDB MODELS: COUNTERFLOWS**

**All installations and services must be performed by qualified service personnel.**

This CDB furnace has been factory supplied with two high quality reusable filters rated at 600 ft/min. These filters are designed to be mounted on the return air plenum opening on the top of the furnace in the double “vee” style rack provided. (see Figure 20). If feasible, it is recommended that slits be cut in the return front to allow for easier access of the filters.



**Figure 20**

### **3. USE OF NON-THERMO PRIDE FILTER RETENTION MEANS**

If a method other than the Thermo Pride filter rack is selected for retention of the filter and/or use of a different filter type is desired, see Table 6 for minimum size guidelines for selecting a filter system for the CHB or CDB furnaces.

**MINIMUM FILTER AREA REQUIRED (LENGTH X WIDTH, SQ. IN.)**

FILTER TYPE	MAXIMUM RATE AIR VELOCITY	FURNACE MODEL			
		CHB,CDB50	CHB,CDB75	CHB,CDB100	CHB,CDB125
*THERMO PRODUCTS SUPPLIED PERMANENT FILTER	600 FT./MIN.	172 IN. <sup>2</sup> *	254 IN. <sup>2</sup> *	328 IN. <sup>2</sup> *	402 IN. <sup>2</sup> *
STANDARD PERMANENT FILTER	500 FT./MIN.	208 IN. <sup>2</sup>	304 IN. <sup>2</sup>	394 IN. <sup>2</sup>	484 IN. <sup>2</sup>
DISPOSABLE TYPE FILTER	300 FT./MIN.	344 IN. <sup>2</sup>	506 IN. <sup>2</sup>	656 IN. <sup>2</sup>	804 IN. <sup>2</sup>

**TABLE 6**

\* The Thermo Products supplied filter can be cut to size to fit other filter retention systems as long as the minimum size requirement is met. NOTICE: Any internal stiffeners used in the filter must not be removed, although they can be cut to size as needed.

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**NOTICE:** The filter areas in table 6 are the **minimum** areas required based on the CFM generated by the furnace for standard heating speeds only. The following formula can be used to determine the minimum filter area required for cooling if the unit is equipped with cooling. This value should then be compared to the value shown in table 6 and the larger of the two should then be used for determining the minimum filter area required for that installation.

FORMULA:

$$\frac{(\text{tons of cooling}) \times (400 \text{ CFM per ton}) (144 \text{ square inches per foot})}{(\text{max. air velocity of filter from table 6 for the filter type})} = \text{filter area sq.inches}$$
$$= \text{length} \times \text{width of filter in inches}$$

EXAMPLE: If you had a CHB-100 furnace and 4 tons of cooling and a standard permanent filter.

$$\frac{4 \text{ tons} \times 400 \text{ CFM} \times 144}{500} = 460 \text{ square inches for cooling}$$

For heating a CHB-100 needs 394 square inches of filter. The filter system must be designed for the larger CFM requirement determined for cooling of 460 square inches. A filter would have to be sized so that the area (length X width) was at least 460 sq. in.

## **O. WIRING**

All wiring shall be performed by a qualified electrician or service person. The wiring must comply with local codes, the instructions in this manual, and in the absence of codes with the National Electrical Code ANSI/NFPA-70 (LATEST EDITION).

1. The following items are guidelines to complete the wiring portion of the installations.
  - a. A separate power supply circuit with over current protection and a disconnect switch must be provided. The minimum fuse or circuit breaker size is 20 amp.
  - b. All CHB and CDB Series furnaces are supplied with a fuse disconnect switch box to be mounted on the outside surface of the right or left side casing so a fuse disconnect can be mounted on the furnace. Make the 115 volt supply connection in this junction box. A green screw and a strain relief are provided in order to connect the power supply ground wire and provide strain relief for the 115 volt power leads from the furnace in the fuse disconnect box. A disconnect switch can be field mounted on the 2x4 box provided. If not, the disconnect switch must be located reasonably close to and within sight of the furnace.

**NOTICE:** The hot surface igniter and operation of this furnace depends on correct polarity. The hot leg of the supply circuit must be connected to the **black** line lead and the common leg to the

**All installations and services must be performed by qualified service personnel.**

white line lead in the field mounted junction box. The hot leg must pass through the disconnect switch in all cases to prevent the hazard of electrical shock when servicing.

**IMPORTANT:** The furnace must be grounded in accordance with local codes and with the National Electrical Code, ANSI/NFPA NO. 70 (Latest Edition) when an external electrical source is utilized.

## **2. ELECTRONIC AIR CLEANER (EAC) AND HUMIDIFIER INSTALLATION**

The ignition module on this furnace has designated terminals to control the operation of an electronic air cleaner and/or humidifier. These terminals provide line voltage (110-20VAC) for the control of these accessories. (see Figure 23). **NOTICE:** It is important to confirm that the operating voltage of the humidifier or EAC being installed matches the output of this control. If not, a field supplied relay or transformer may be necessary to provide the proper control and supply voltage for the accessory being installed. See the mfrs. instructions for the humidifier or EAC for additional instructions.

## **3. THERMOSTAT ANTICIPATOR SETTING**

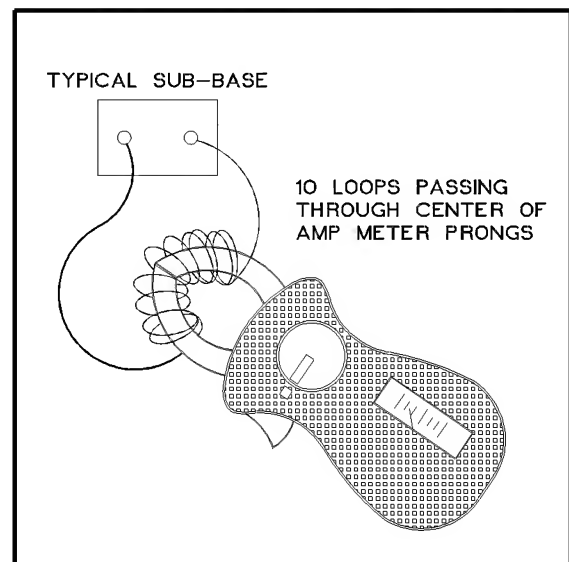
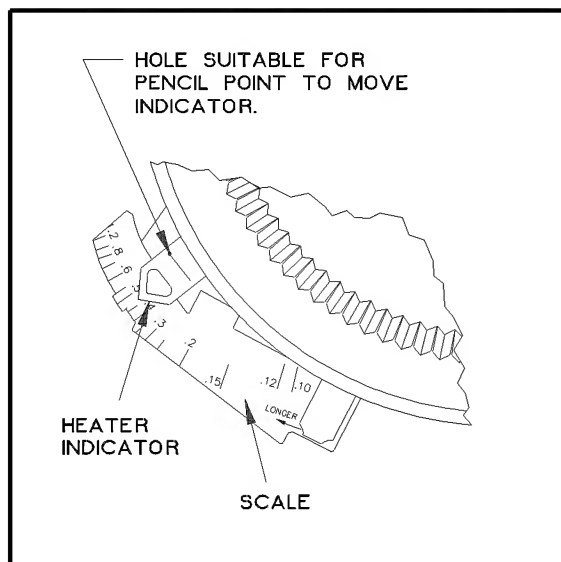
Proper control of the indoor temperature can only be achieved if the thermostat is calibrated to the heating and/or cooling cycle. A vital consideration of this calibration is related to the thermostat heat anticipator.

The proper thermostat heat anticipator setting is 0.8 AMPS for furnace operation only. To increase length of cycle, increase setting of heat scale; to decrease length of cycle, decrease setting of heat scale.

Anticipators for the cooling operation are generally pre-set by the thermostat manufacturer and require no adjustment.

Anticipators for the heating operation are of two types, pre-set and adjustable. Those that are pre-set will not have an adjustment scale and are generally marked accordingly.

Thermostat models having a scale as shown in Figure 21 must be adjusted to each application.



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**Figure 21**

**Figure 22**

In many cases, this adjustment setting can be found in the thermostat installation instructions. If this information is not available or if the correct setting is questioned, the following procedures should be followed:

**PREFERRED METHOD:**

Use a low scale ammeter such as an amp check. Connect the meter across terminals “R” and “W” on the sub-base (“RH” & “W” on multi-state thermostat sub-base) or

**STEP 1.** Wrap 10 loops of single strand insulated thermostat wire around the prongs of an amp meter. Set the scale to the 1 to 5 or 1 to 6 amp. scale.

**STEP 2.** Connect the uninsulated ends of this wire jumper across terminals “R” and “W” on the sub-base (“RH” and “W” on multi-stage thermostat sub-base). See Figure 22. This test must be performed without the thermostat attached to the sub-base.

**STEP 3.** Let the heating system operate in this position for about one minute. Read the amp meter scale. Whatever reading is indicated must be divided by 10 (for 10 loops of wire).

This is the setting at which the adjustable heat anticipator should be set.

FORMULA:  $\frac{\text{Amp meter reading}}{10 \text{ loops}} = \text{ANTICIPATOR SETTING}$

OR:  $\frac{2.5 \text{ AMPS}}{10} = .25 \text{ AMPS SETTING}$

**STEP 4.** The pointer should be moved to a higher setting if a slightly longer cycle is desired. Slightly shorter cycles can be achieved by moving to a lower setting.

**STEP 5.** Remove the meter jumper wire and reconnect the thermostat. Check the thermostat in the heating mode for proper operation.

**NOTICE:** The length of the heating cycle can also be affected by the fan limit control settings (if applicable). The fan “ON” and “OFF” settings should be checked at this point.

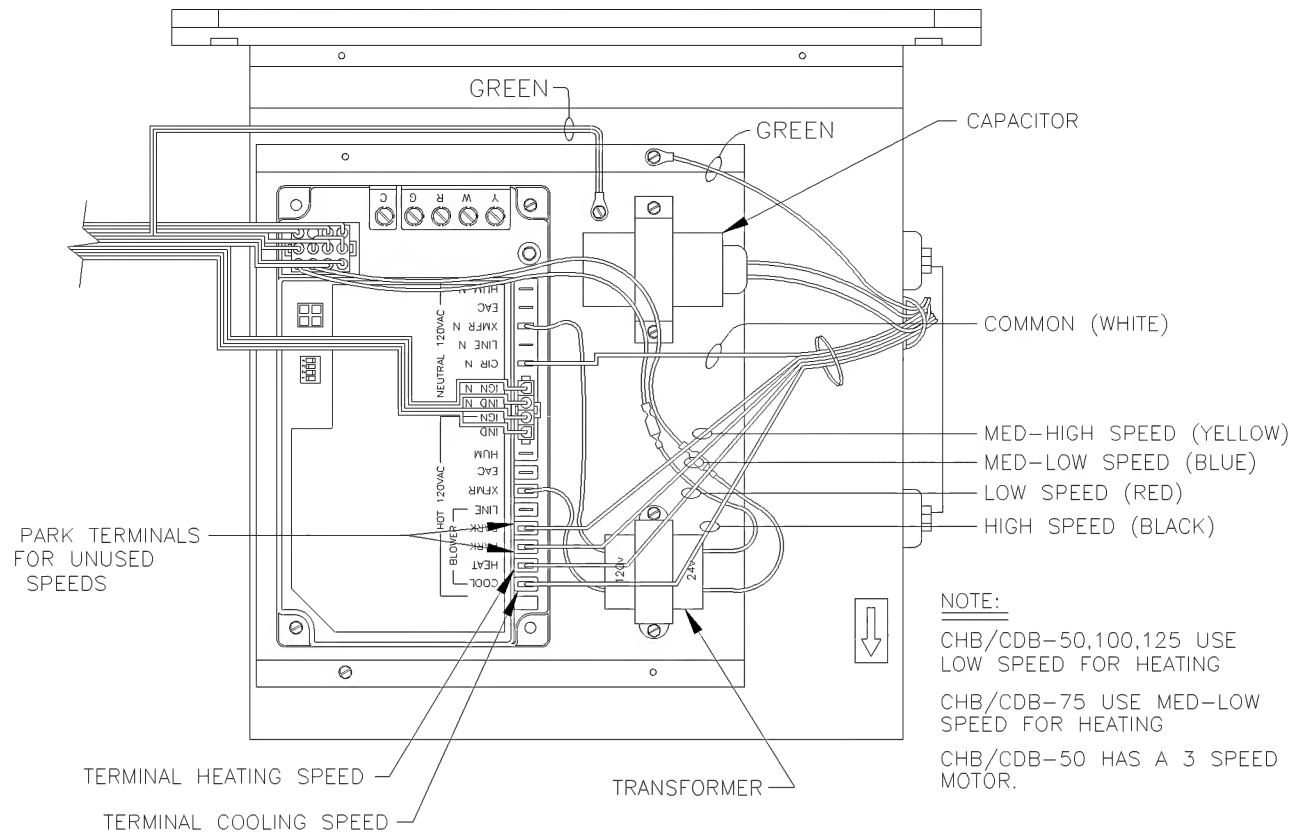
For thermostats having 2 stage heat, Step 1 and 2 and 3 must be repeated. Second stage heat is controlled through terminals “RH” and “W2” on the sub-base.

If Digital Amp Probe is used, read amp draw direct from meter, then Step #1 is not required.

#### **4. BLOWER MOTOR SPEED WIRING**



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**Figure 23**

**⚠WARNING:** *TURN OFF THE ELECTRICAL POWER to the furnace before attempting to change blower speed wiring.*

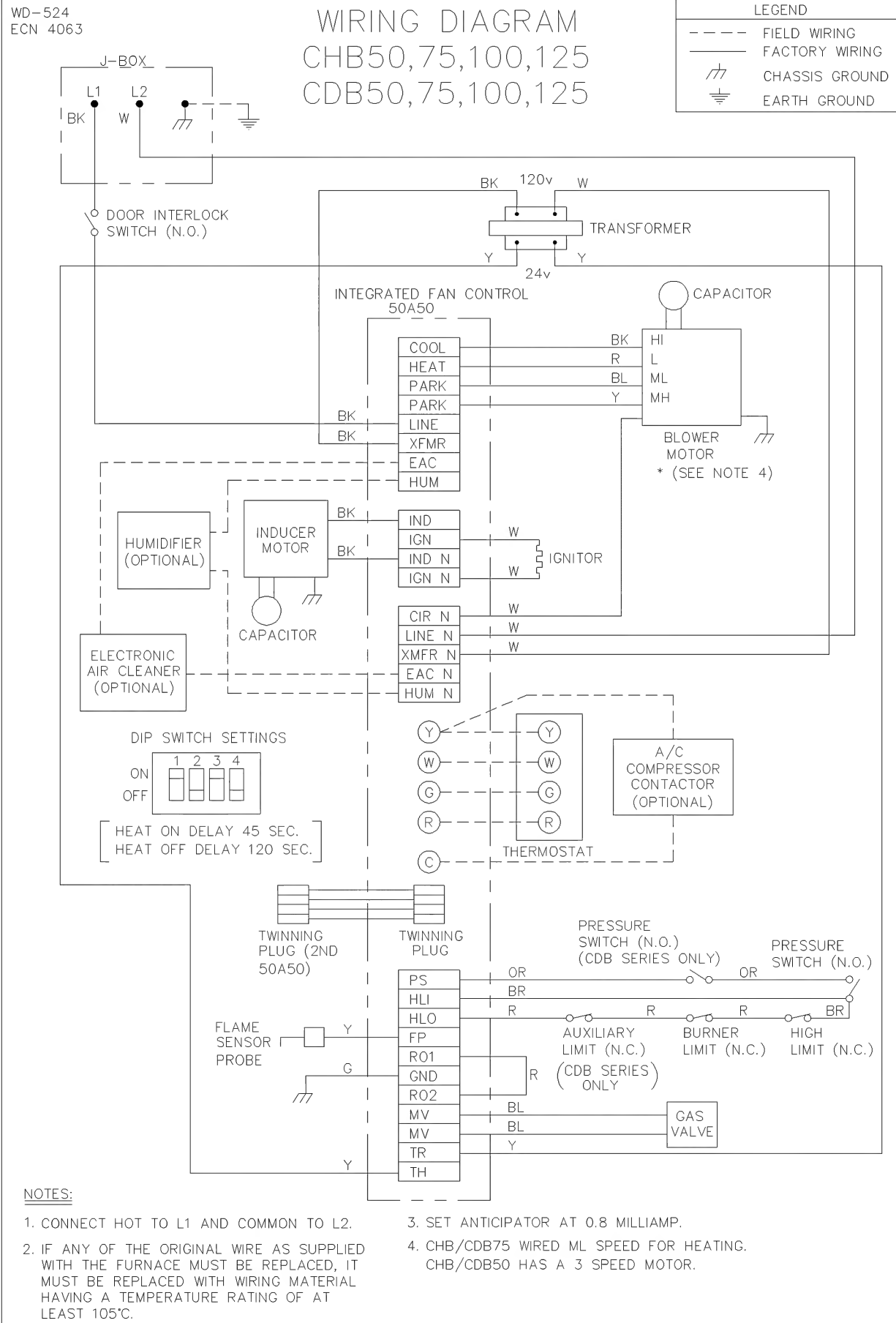
The furnace is factory wired to the ignition control with standard heating and cooling speeds. When changing motor speeds, simply switch the needed speed to either the heating or cooling terminal as applicable on the module to obtain the desired CFM. The unused speeds should then be reconnected to the module in the “park” positions.

## 5. FIELD WIRING AND REPLACING WIRING

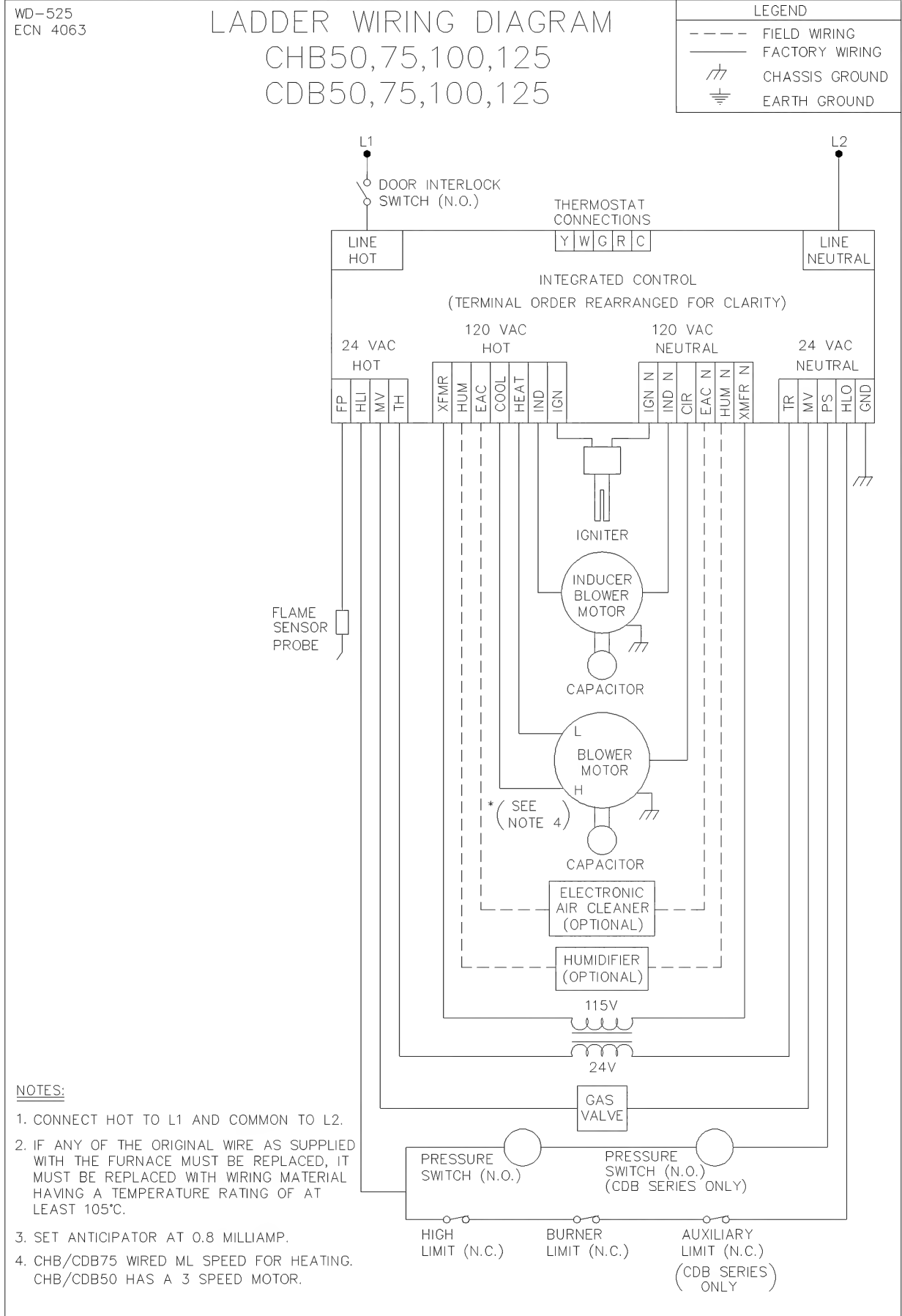
Field wiring between the furnace and devices not attached to the furnace shall conform with the temperature limitation for Type T 35 C wire. If any of the original factory supplied furnace wiring is replaced or a separate device other than the thermostat is wired internal to the unit 105°C thermoplastic or equivalent wire must be used.

**All installations and services must be performed by qualified service personnel.**

**All installations and services must be performed by qualified service personnel.**



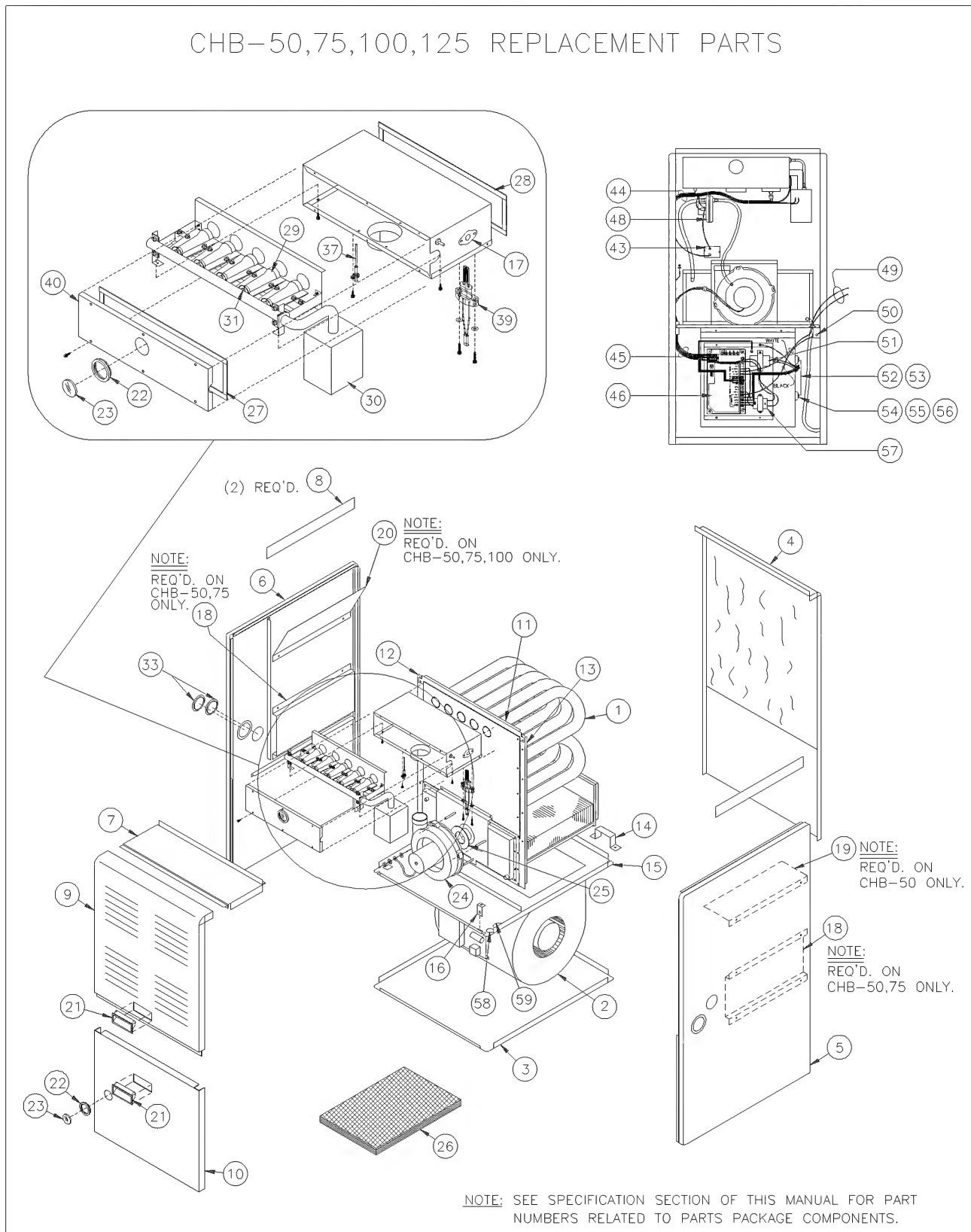
**All installations and services must be performed by qualified service personnel.**



All installations and services must be performed by qualified service personnel.

## P. REPLACEMENT PARTS LISTS

### 1. Replacement parts list for CHB-50, CHB-75, CHB-100 and CHB-125.



## All installations and services must be performed by qualified service personnel.

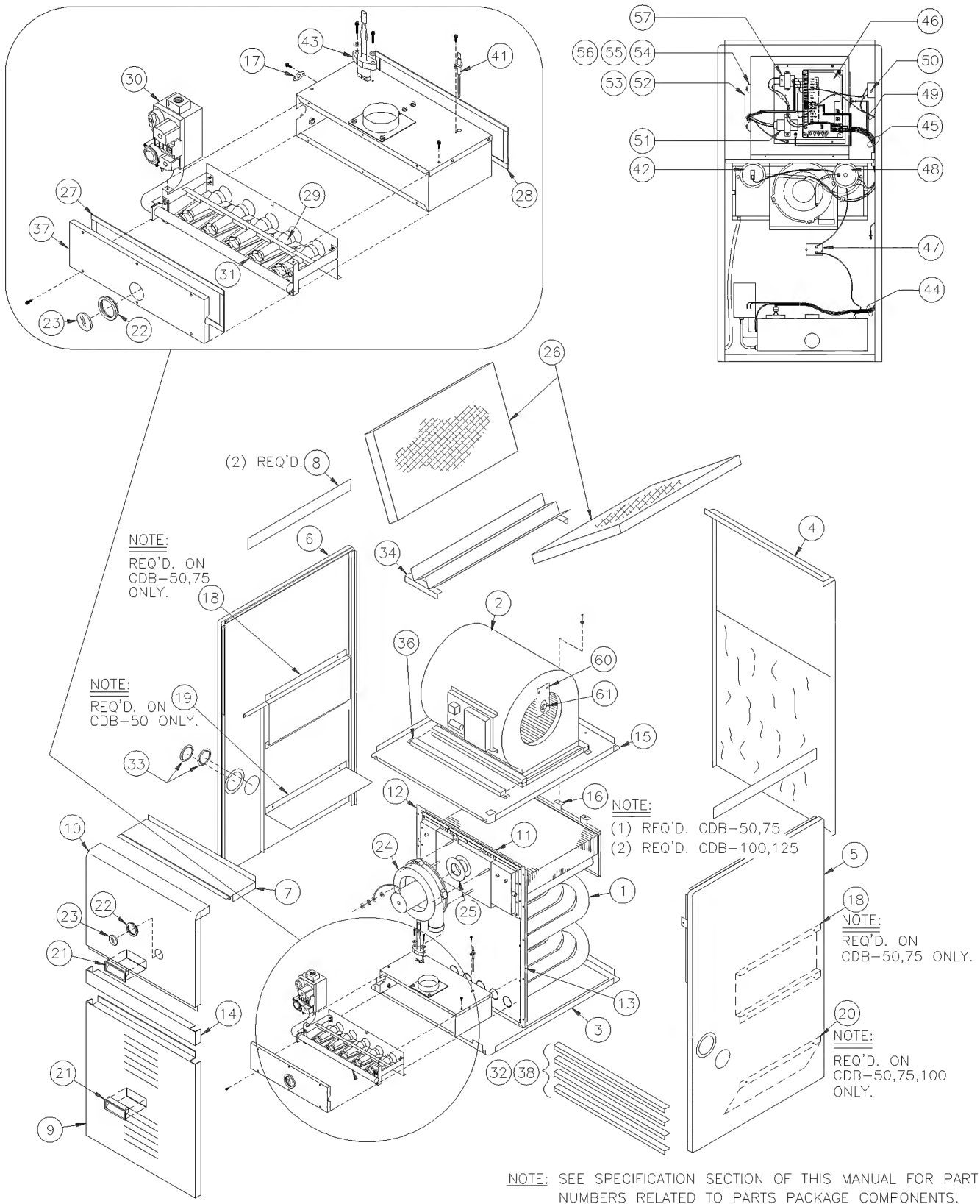
ITEM	UNIT PARTS DESCRIPTION		CHB-50		CHB-75		CHB-100		CHB-125	
			PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.
1	HEAT EXCHANGER		32390	1	32391	1	32392	1	32393	1
2	BLOWER ASSEMBLY		500S4067	1	500S4068	1	500S4069	1	500S4070	1
3	BASE		10719	1	10719	1	10720	1	10721	1
4	CASING BACK		10771	1	10771	1	10772	1	10773	1
5	SIDE CASING (RIGHT)		20095	1	20095	1	20095	1	20095	1
6	SIDE CASING (LEFT)		20094	1	20094	1	20094	1	20094	1
7	TOP CENTER PANEL		20707	1	20707	1	20708	1	20709	1
8	PLENUM STRIPS		13382	2	13382	2	13382	2	13382	2
9	FRONT DOOR		10768	1	10768	1	10769	1	10770	1
10	BLOWER ACCESS DOOR		20716	1	20716	1	20717	1	20718	1
11	TRIM PLATE (TOP)		11186	1	11186	1	11187	1	11188	1
12	TRIM PLATE (LEFT)		11189	1	11189	1	11190	1	11189	1
13	TRIM PLATE (RIGHT)		11191	1	11191	1	11192	1	11191	1
14	HEAT EXCHANGER SUPPORT		12394	1	12394	1	12394	1	12394	1
15	BLOWER PAN		21144	1	21144	1	21145	1	21146	1
16	DOOR SWITCH BRACKET		13922	1	13922	1	13922	1	13922	1
17	LIMIT SWITCH (ROLLOUT)		350484	1	350484	1	350485	1	350484	1
18	COIL CHUTE BAFFLE		14333	2	14333	2	—		—	
19	SIDE CASING BAFFLE		14330	1	—		—		—	
20	SIDE CASING (ANGLE) BAFFLE		14329	1	14329	1	14329	1	—	
21	DOOR PULL		320157	2	320157	2	320157	2	320157	2
22	SIGHT GLASS GASKET		330135	1	330135	1	330135	1	330135	1
23	SIGHT GLASS		15887	1	15887	1	15887	1	15887	1
24	INDUCER		340330	1	340330	1	340330	1	340330	1
25	INDUCER GASKET		330148	1	330148	1	330148	1	330148	1
26	FILTER		(18x25x1) 370023	1	(18x25x1) 370023	1	(18x25x1) 370023	1	(20x25x1) 370051	1
27	SILICONE SPONGE GASKET (1/2 IN. WIDE)		330141	23.25"	330141	28.50"	330141	33.75"	330141	39.50"
28	SILICONE GASKET TAPE (1" WIDE)		330140	21"	330140	26.50"	330140	32.25"	330140	38"
29	BURNER TUBE		380595	2	380595	3	380595	4	380595	5
30	GAS VALVE	NAT.	380622	1	380622	1	380622	1	380622	1
		L.P.	380620		380620		380620		380620	
31	ORIFICE	NAT.	380600	2	380600	3	380600	4	380600	5
		L.P.	380039		380039		380039		380039	
32										
33	BUTTON PLUG		350046	2	350046	2	350046	2	350046	2
34										
35										
36										
37	SENSOR		350759	1	350759	1	350759	1	350759	1
38										
39	IGNITER		380611	1	380611	1	380611	1	380611	1
40	COVER		15922	1	15923	1	15924	1	15925	1
41										
42										
43	LIMIT SWITCH		350473	1	350473	1	350473	1	350473	1
44	HARNESS (VESTIBULE)		350778	1	350778	1	350778	1	350778	1
45	HARNESS (BLOWER)		350466	1	350466	1	350466	1	350466	1
46	CONTROL, INTEGRATED FAN		350486	1	350486	1	350486	1	350486	1
47										
48	PRESSURE SWITCH		350498	1	350498	1	350498	1	350498	1
49	HARNESS (SUPPLY)		350704	1	350704	1	350704	1	350704	1
50	DOOR INTERLOCK SWITCH		350139	1	350139	1	350139	1	350139	1
51	CAPACITOR		350073 10/370	1	350073 10/370	1	350073 10/370	1	350077 15/440	1
52	MOTOR		350571 1/5 H.P. (7126-3710)	1	350346 1/2 H.P. (HE3J191N)	1	350337 1/2 H.P. (HE3L092N)	1	350572 3/4 H.P. (7126-3533)	1
53	MOTOR MOUNTING BRKT		350629	1	350629	1	350629	1	350629	1
54	GROMMET SPACER		300031	3	300031	3	300031	3	300031	3
55	GROMMET RING		300028	3	300028	3	300028	3	300028	3
56	GROMMET BUSHING		300029	3	300029	3	300029	3	300029	3
57	TRANSFORMER 24v		350464	1	350464	1	350464	1	350464	1
58	HEYCO BUSHING (SR34-2)		350016	1	350016	1	350016	1	350016	1
59	GROMMET GRO-7/8		350446	1	350446	1	350446	1	350446	1
60	FILTER RACK KIT		AOPS7547	1	AOPS7547	1	AOPS7547	1	AOPS7375	1
61	CONCENTRIC VENT KIT		370171	1	370171	1	370171	1	370171	1
62	TWINNING KIT		AOPS7363	1	AOPS7363	1	AOPS7363	1	AOPS7363	1

OPTIONAL ITEMS (NOT SHOWN)

**All installations and services must be performed by qualified service personnel.**

## 2. Replacement parts list for CDB-50, CDB-75, CDB-100 and CDB-125.

### CDB-50,75,100,125 REPLACEMENT PARTS



## All installations and services must be performed by qualified service personnel.

ITEM	UNIT PARTS DESCRIPTION		CDB-50		CDB-75		CDB-100		CDB-125	
			PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.
1	HEAT EXCHANGER		32405	1	32406	1	32407	1	32408	1
2	BLOWER ASSEMBLY		SOOS4091	1	SOOS4092	1	SOOS4093	1	SOOS4094	1
3	BASE		10774	1	10774	1	10775	1	10776	1
4	CASING BACK		10731	1	10731	1	10732	1	10733	1
5	SIDE CASING (RIGHT)		20097	1	20097	1	20097	1	20097	1
6	SIDE CASING (LEFT)		20096	1	20096	1	20096	1	20096	1
7	TOP CENTER PANEL		10736	1	10736	1	10737	1	10738	1
8	PLENUM STRIPS		13403	2	13403	2	13403	2	13403	2
9	FRONT DOOR		20726	1	20726	1	20728	1	20730	1
10	BLOWER ACCESS DOOR		10725	1	10725	1	10727	1	10729	1
11	TRIM PLATE (TOP)		11151	1	11151	1	11152	1	11153	1
12	TRIM PLATE (LEFT)		11193	1	11193	1	11195	1	11193	1
13	TRIM PLATE (RIGHT)		11194	1	11194	1	11196	1	11194	1
14	FRONT CENTER PANEL		10752	1	10752	1	10753	1	10754	1
15	BLOWER PAN		21222	1	21222	1	21223	1	21224	1
16	COIL SUPPORT		22385	1	22385	1	22385	2	22385	2
17	LIMIT SWITCH (ROLLOUT)		350484	1	350484	1	350485	1	350484	1
18	COIL CHUTE BAFFLE		14333	2	14333	2	—	—	—	—
19	SIDE CASING BAFFLE		14330	1	—	—	—	—	—	—
20	SIDE CASING (ANGLE) BAFFLE		14329	1	14329	1	14329	1	—	—
21	DOOR PULL		320157	2	320157	2	320157	2	320157	2
22	SIGHT GLASS GASKET		330135	1	330135	1	330135	1	330135	1
23	SIGHT GLASS		15887	1	15887	1	15887	1	15887	1
24	INDUCER		340330	1	340330	1	340330	1	340330	1
25	INDUCER GASKET		330148	1	330148	1	330148	1	330148	1
26	FILTER		(14x22x1) 370052	2	(14x22x1) 370052	2	(14x22x1) 370052	2	(14x22x1) 370052	2
27	SILICONE SPONGE GASKET (1/2 IN. WIDE)		330141	23.25"	330141	28.50"	330141	33.75"	330141	39.50"
28	SILICONE GASKET TAPE (1" WIDE)		330140	21"	330140	26.50"	330140	32.25"	330140	38"
29	BURNER TUBE		380595	2	380595	3	380595	4	380595	5
30	GAS VALVE	NAT.	380622	1	380622	1	380622	1	380622	1
		L.P.	380620		380620		380620		380620	
31	ORIFICE	NAT.	380600	2	380600	3	380600	4	380600	5
		L.P.	380039		380039		380039		380039	
32	PLENUM STRIP		13411	2	13411	2	13412	4	13412	4
33	BUTTON PLUG		350046	2	350046	2	350046	2	350046	2
34	FILTER RACK		24803	1	24803	1	24803	1	24803	1
35										
36	BLOWER HOLD DOWN		14325	2	14325	2	14326	2	14327	2
37	COVER		15922	1	15923	1	15924	1	15925	1
38	PLENUM STRIP		13412	2	13412	2	—	—	13413	2
39										
40										
41	SENSOR		350759	1	350759	1	350759	1	350759	1
42	PRESSURE SWITCH		350442	1	350442	1	350442	1	350442	1
43	IGNITER		380611	1	380611	1	380611	1	380611	1
44	HARNESS (VESTIBULE)		350780	1	350780	1	350780	1	350780	1
45	HARNESS (BLOWER)		350781	1	350781	1	350781	1	350781	1
46	CONTROL, INTEGRATED FAN		350486	1	350486	1	350486	1	350486	1
47	LIMIT SWITCH		350473	1	350473	1	350473	1	350473	1
48	PRESSURE SWITCH		350498	1	350498	1	350498	1	350498	1
49	HARNESS (SUPPLY)		350705	1	350705	1	350705	1	350705	1
50	DOOR INTERLOCK SWITCH		350139	1	350139	1	350139	1	350139	1
51	CAPACITOR		350073 10/370	1	350073 10/370	1	350073 10/370	1	350077 15/440	1
52	MOTOR		350571 1/5 H.P. (7126-3710)	1	350346 1/2 H.P. (HE3J191N)	1	350337 1/2 H.P. (HE3L092N)	1	350572 3/4 H.P. (7126-3533)	1
53	MOTOR MOUNTING BRKT		350629	1	350629	1	350629	1	350629	1
54	GROMMET SPACER		300031	3	300031	3	300031	3	300031	3
55	GROMMET RING		300028	3	300028	3	300028	3	300028	3
56	GROMMET BUSHING		300029	3	300029	3	300029	3	300029	3
57	TRANSFORMER 24v		350464	1	350464	1	350464	1	350464	1
58										
59										
60	LIMIT BRACKET		14149	1	14149	1	14149	1	14149	1
61	AUX. LIMIT SWITCH		350472	1	350472	1	350472	1	350472	1
62										
63	CONCENTRIC VENT KIT		370171	1	370171	1	370171	1	370171	1
64	TWINNING KIT		AOPS7363	1	AOPS7363	1	AOPS7363	1	AOPS7363	1

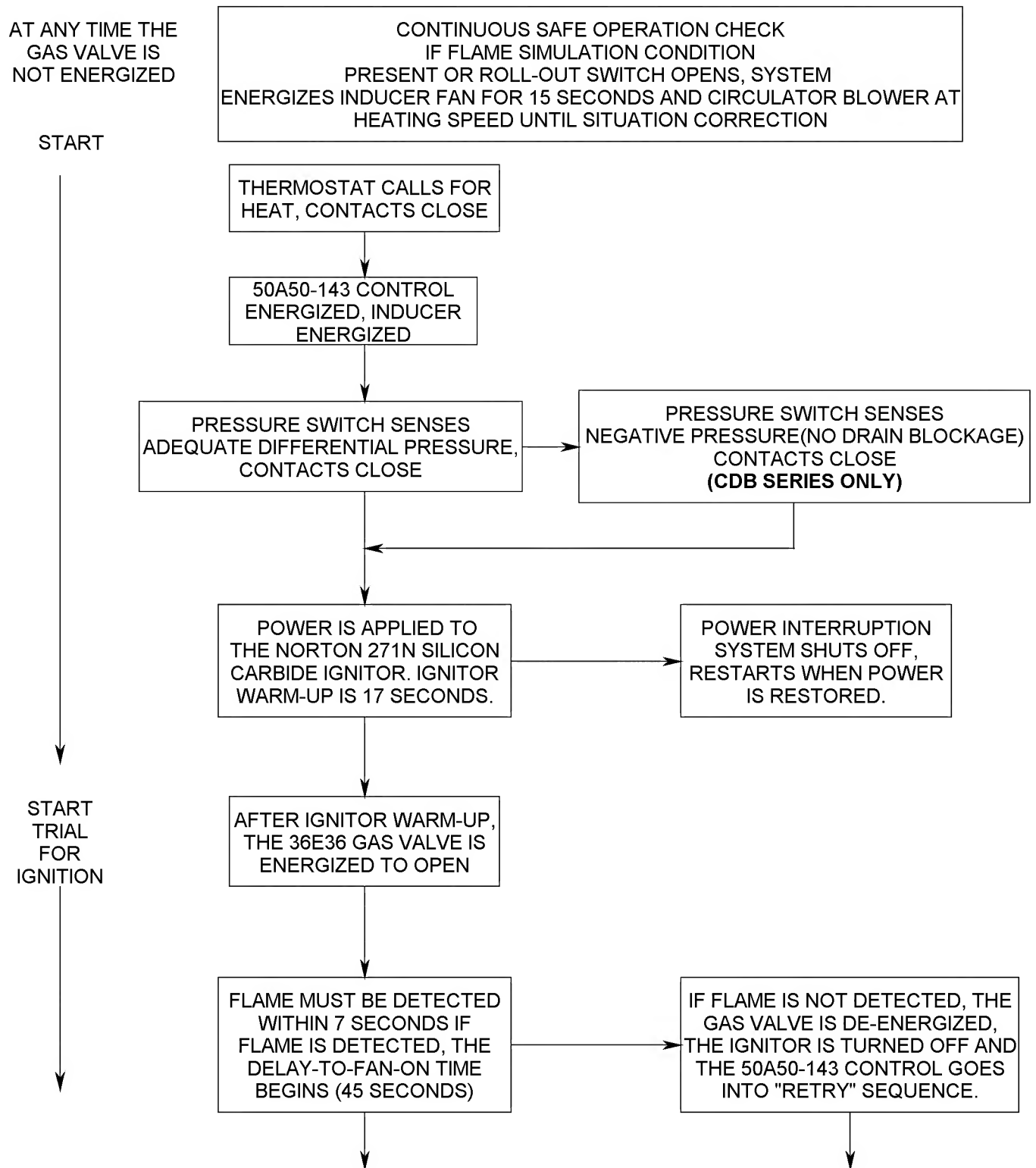
} OPTIONAL ITEMS (NOT SHOWN)



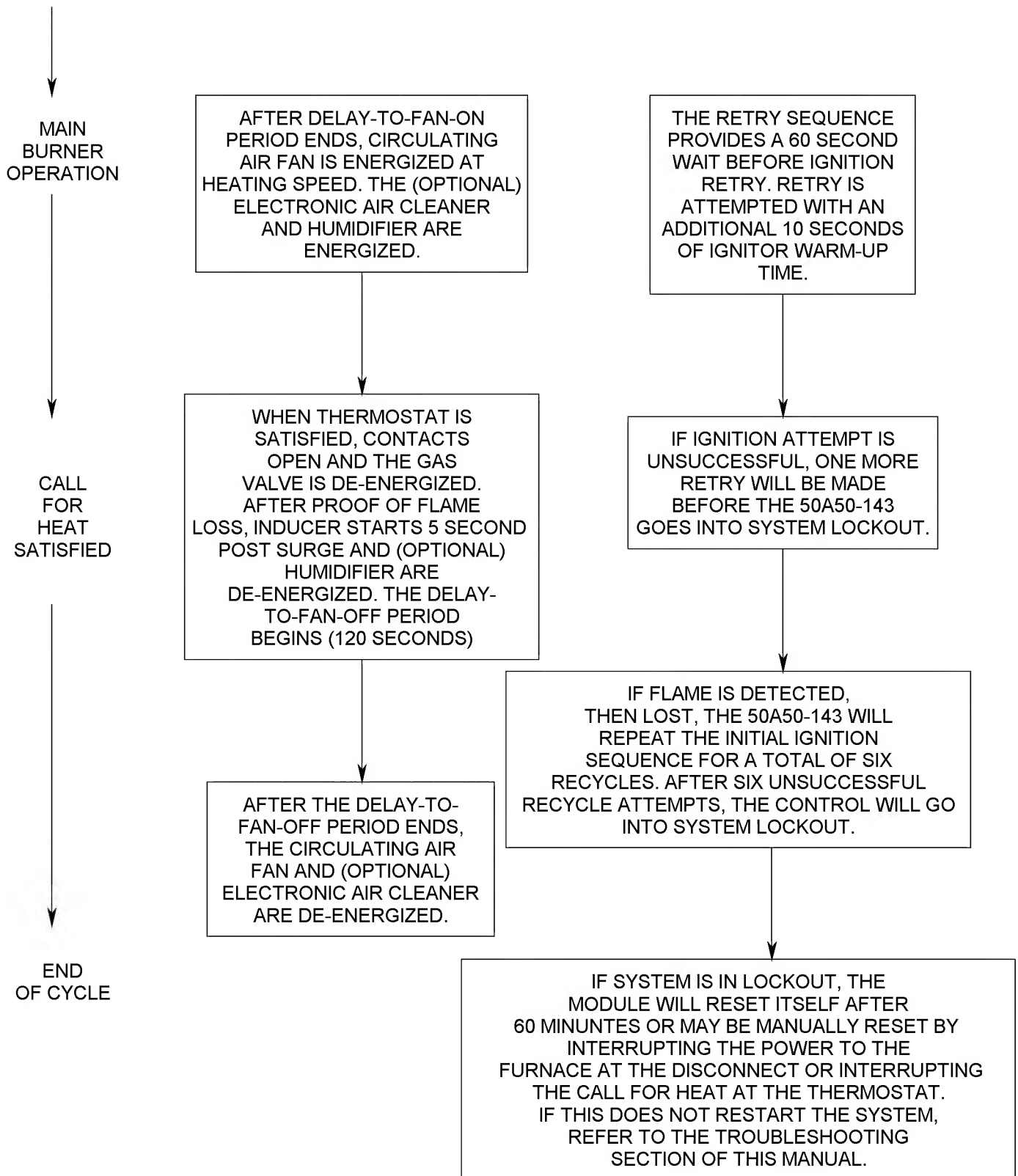
**All installations and services must be performed by qualified service personnel.**

## V. STARTING THE UNIT

### A. SEQUENCE OF OPERATIONS



**All installations and services must be performed by qualified service personnel.**



**All installations and services must be performed by qualified service personnel.**

## **B. INITIAL START UP:**

This furnace does not have a pilot. It is equipped with a hot surface igniter which automatically lights the burner. Do not attempt to light the burner by hand. Check the following items before the initial start-up.

1. Check all wiring for loose connections and proper hook up.
2. Leak test gas piping connections.
3. Check all tubing to the pressure switch and drains to make sure they are connected firmly at all their connection points.
4. Check flue pipe, combustion air inlet and all pvc connections for tightness and to make sure there is no blockage.
5. Make sure air filter is in place.
6. Make sure the outside vent and air intakes are installed according to instructions and that they are free from blockage.
7. Make sure that the drain trap is properly connected to the furnace and to the buildings drain system.

## **OPERATING INSTRUCTIONS:**

***⚠WARNING:*** Turn off power to furnace before it is placed into service. The gas piping system must have been leak tested by a qualified heating contractor. (See Section IV, J, of these instructions on the installation of gas piping).

***⚠WARNING:*** It may be necessary to purge the air out of the gas line for initial start-up of the furnace after installation. This should be done by a qualified heating contractor. If excessive gas escapes when purging the gas supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because the specific gravity of LP gas allows it to accumulate at floor level at a dangerous concentration. For remainder of operating instructions, reference Users Information Manual.

***⚠WARNING:*** Heat exchanger oil will burn off on initial firing creating an unpleasant odor. To prevent this odor from occurring more than once, it is suggested that:

1. A window(s) be opened.
2. The thermostat be set at highest setting.
3. The furnace remain running at conditions 1&2 for 30 minutes or until odor has dissipated.

## **C. ADJUSTMENT OF BTU INPUT RATE:**

The orifice for this furnace was sized: 1) for natural gas having a heating value of 1025 BTU per cubic foot and a specific gravity of .65, or 2) for liquefied propane gas with a heating value of 2500 BTU per cubic foot and a specific gravity of 1.55. The information plate inside the furnace vestibule will specify which gas your furnace is orificed for. If the furnace is installed at an altitude that is more than 2,000 feet above sea level, it is mandatory that the input to the burner be

**All installations and services must be performed by qualified service personnel.**

reduced 4.0% for every 1,000 feet that it is above sea level. If the furnace is installed at an elevation of 5,000 feet, its input must be reduced 20.0%. Example: a furnace rated at 100,000 BTU at sea level must be reduced to a firing rate of 80,000 ( $100,000 \times .80 = 80,000$ ) at an elevation of 5,000 feet. If the furnace is installed at an elevation of 2,000 feet or less, no reduction in input is required. Your gas supplier will supply you with the correct orifice sizing information.

To check the input of your natural gas furnace, allow the unit to operate for 10 to 15 minutes and proceed as follows:

- a. Call your gas supplier and ask for the BTU content (heating value) of one cubic foot of the gas, supplied to the installation area. An alternate approach is to assume a value of 1025 BTU/Cu Ft which is the national average.
- b. With all other gas appliances turned off and using a stop watch, clock the time required for the (small) dial on the gas meter to make one full revolution. The meter will state how many cubic feet is flowed for one revolution usually one, two or five. The unit must have been in operation at least 10 minutes before clocking.

**FORMULA:**  $\frac{\text{BTU/Cu Ft} \times \text{Number of Cu Ft} \times 3600 \text{ Seconds}}{\text{Seconds for one revolution}} = \text{Input BTU/hr}$

**EXAMPLE:**  $\frac{1025 \text{ BTU/Cu Ft} \times 2 \text{ Cu Ft} \times 3600}{74.8 \text{ Seconds}} = 98,663 \text{ BTU Input}$

Check for the model number of this furnace, its input, the type of gas and the manifold pressure on the information plate located on the vestibule panel behind the upper front panel. If using the above example, the furnace was a CHB-100 model and the 98,663 BTU input would be acceptable because it was within 2% of the listed input of 100,000.

- c. Make sure that the gas supply pressure to the furnace falls within the maximum range of 4-1/2" to 14" wc pressure on natural gas and 11.0" to 14.0" w.c. on LP gases. The pressure to the furnace must be checked while the furnace burner and any other gas appliances on the same supply system are operating, using the 1/8" in. plugged tap shown in Section IV, J, of this manual.

**GAS PRESSURE CHART FOR ALL CHB MODEL FURNACES**

	SUPPLY PRESURE	MANIFOLD PRESSURE
NAT	MAX 14" WC MIN 4.5" WC	3.5" $\pm$ .3" WC
LP	MAX 14" WC MIN 11" WC	10.0" $\pm$ .3" WC

**TABLE 7**

This gas furnace is equipped with a fixed orifice sized for the manifold pressure shown on the information plate. The input can only be increased or decreased by adjusting the manifold pressure. Remove the 1/8" threaded pipe plug located on the top right side of the gas valve.

**All installations and services must be performed by qualified service personnel.**

Use a U tube manometer or pressure gage to measure the pressure. To adjust the pressure, remove the screw from the regulator on the outlet side of the gas valve and using the adjustment allen screw, decrease the pressure by turning the screw counterclockwise or increase it by turning the screw clockwise. **ADJUSTMENTS TO THE LISTED PRESSURE MUST NOT EXCEED 0.3" w.c.** A 0.3" w.c. adjustment will increase or decrease the input approximately 4.0%. Replace screw (cap) when adjustment is complete.

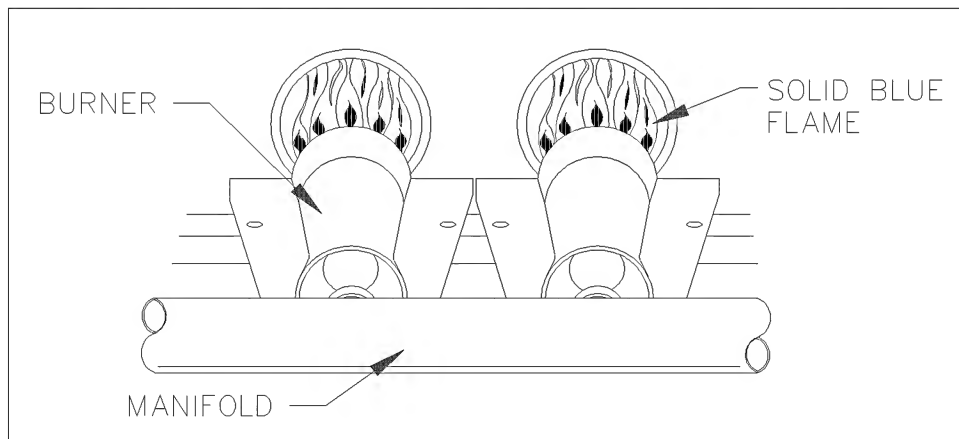
The correct input can be assumed if the furnace manifold pressure is the same as that shown on the information label if a gas meter is not available for natural gas or the unit is installed on liquefied petroleum gases which are not metered.

Shut off the gas supply to the furnace. Remove the pressure gage and re-install the pipe plug using a thread compound resistant to the action of LP gases.

If the rated input cannot be obtained with the present orifice at the correct pressure, your local gas supplier will assist in sizing the proper orifice. Our Engineering Department will gladly assist in sizing the orifice if you provide them with the heating value in BTU per cubic foot and the specific gravity of the gas.

#### **D. BURNER ADJUSTMENT**

This unit is designed to not require any burner adjustment. The flames should be checked by looking through the sight glass located on the burner box. Burner flames should be clear, blue and almost transparent in color. (see Figure 24). **NOTE:** It is not unusual to have orangish flames visible in the tube for LP gas.



**Figure 24**

**⚠CAUTION:** *The CHB/CDB furnace models are an in-shot burner design which does not require an air shutter adjustment (air shutters are not used) for proper flame characteristics. Burner box access cover must always be secured with all screws in place and tightened before operating furnace.*

**All installations and services must be performed by qualified service personnel.**

## **E. SETTING TEMPERATURE RISE**

All CHB/CDB Models are designed and wired at the factory for a heating blower speed that should result in an approximate temperature rise of 70°F. The blower motors are wired on low speed for heating mode on all models, except the (CHB, CDB75). These models are wired on medium low speed. The temperature rise through the furnace may vary depending on the duct system, elevation, heating value, etc. for each installation. A lower temperature rise will result in a higher efficiency. Temperature rise = supply air temperature - return air temperature.

After 10 to 15 minutes of continuous operation, the temperature rise through the furnace must fall within a range of 55°F to 85°F. If the outlet or supply duct temperature is too high, you should check to make sure that your return air filter is clean, your return air registers are free from obstruction, your outlet registers are properly adjusted and clear and your supply and return air ducts are open.

The circulating air blower is not moving enough air if the supply air temperature is still too high. Before proceeding further, turn off the power supply to the furnace and remove the blower door. The speed of the blower must be increased by changing the speed tap from the motor (See figure 23). This is accomplished by locating the control panel attached to the blower housing and switching the red (low) or blue (med. low) blower lead, which should be connected to the "Heat" terminal on the White-Rodgers 50A50-143 control, with one of the higher speed blower leads attached to a terminal marked "Park". The parked leads should be yellow or blue, which corresponds to medium-low or medium-high speed. Be sure to attach any unused blower leads to a terminal marked "Park". Replace the blower door and turn on the power supply.

## **F. FURNACE CHECKOUT PROCEDURE**

Before any system of gas piping is finally put into service, it shall be carefully tested to assure that it is gas tight as indicated in the Gas Piping Section of this Burner Manual.

**NOTICE:** All controls on the unit should be checked for proper functioning prior to the qualified service personnel leaving the job site. Specifically the following should be checked:

With furnace in normal heating operation, check to make certain blower will start and stop automatically under control of integrated fan control.

1. Check safety limit control as follows:

- a. Shut off incoming power.
- b. Block return air opening or disconnect blower motor leads.
- c. Restore power to furnace.
- d. Set thermostat above room temperature calling for heat.
- e. When temperatures are reached in furnace at limit control setting with blower out of operation, burner should shut off.
- f. Shut off electrical power.

**All installations and services must be performed by qualified service personnel.**

**IMPORTANT:** Remove blockage or reconnect blower motor and restore power.

2. Make certain thermostat will automatically start and stop furnace.
3. Block the flue pipe outlet gradually with a flat piece of metal, until the pressure switch functions shutting off the main burners.
4. Block the PVC pipe inlet gradually with a flat piece of metal until pressure switch functions shutting off the main burners.

**IMPORTANT:** Remove flue air inlet blockage when done.

5. Remove the blower compartment access door with the furnace operating. The door interrupt switch is in the 120 volt circuit and will shut down the entire system. Replace the blower door and the furnace start-up cycle will begin.

## **VI. INSTALLER'S INSTRUCTIONS TO USER:**

After completing the installation, the installer shall inform and/or demonstrate to the homeowner:

1. The location of all the instructions in the furnace and that these instructions and the users information manual must be kept along with instructions for any accessories in the plastic pouch on the inside of the furnace.
2. The location and use of the manual gas shut off valve and furnace electrical disconnect switch. Instruct user to always shut off gas before shutting off electric power.
3. The sequence of operation of the furnace.
4. The correct operation and maintenance of the appliance as outlined in the users information manual.
5. That failure to maintain and operate this furnace in accordance with these instructions could result in hazardous conditions, bodily injury, property damage and may void the limited warranty on the furnace.
6. Review with and encourage the user to read the label reproductions and all warnings and instructions outlined on the front cover and in sections I, II and III of this manual and in the Users Information Manual.
7. Recommend that the user have a qualified heating contractor inspect the furnace at the start of each heating season. Inform the user of the frequency of inspection required for each item in Section IV of the Users Manual.

All installations and services must be performed by qualified service personnel.

## VII. DEALER MAINTENANCE

**The following maintenance procedures should be performed at the beginning of each heating season by a qualified heating contractor. Correct any deficiencies at once.**

**⚠WARNING:** *Personal injury or property damage could result from repair or service of this furnace by anyone other than a qualified heating contractor. Only the homeowner/user routine maintenance described in the Users Information Manual may be performed by the user.*

**⚠WARNING:** *To avoid injury from moving parts, shut off the power to the furnace before removing blower compartment door.*

**⚠CAUTION:** *Label wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.*

### A. ELECTRICAL:

1. Check all wiring for loose connections and any signs of damage or unusual wear.
2. Check for correct voltage at the furnace when operating.
3. Check amp-draw on blower motor and inducer motor to assure they are not exceeding name plate amp rating.
4. Check for correct operation and proper settings (if manually adjustable) of all controls.

**Shut off gas and disconnect power before continuing.**

### B. GENERAL INSPECTION

#### 1. VENT PIPE COMBUSTION AIR INTAKE

a. Remove the radiator hose connector between the inducer and the vent and check the vent for signs of carbon build-up and for signs of blockage.

b. The entire length of vent and combustion air inlet pipe and their terminations should be inspected for restrictions, loose or loosely sealed joints, carbon build-up. Also inspect the outside vent and combustion air terminals and ensure that they are clear and unobstructed.

#### 2. CONDENSATE LINE/TRAP ASSEMBLY

The condensate line must be inspected to make sure it is not blocked. All of the lines should be flushed with water to remove any build-up of sediment.

#### 3. BURNERS

If it appears that material is accumulating in the burner box, the burner box cover can be removed and the box and burners can be vacuumed. If necessary, the burners assembly can be removed by taking out the two screws/one on each bracket on the bottom of the box on CHB's or on top on CDB's and removing the burner manifold assembly. Assembly must be pulled & tilted away from the blower compartment in order to remove from box. If necessary, the individual tubes can be cleaned out using compressed air to blow out the individual tubes. Care must be taken not to damage the igniter.



**All installations and services must be performed by qualified service personnel.**

#### 4. INDUCER BLOWER ASSEMBLY

Inspect the pressure switch and drain tubing connections and inspect the blower/assembly for warpage, deterioration and carbon or other build-up. If necessary, clean the accessible portions of the housing and blower with a damp cloth. Vacuum to remove any lint or dust from the motor assembly.

#### 5. GASKETS/SEALING MATERIALS

Inspect all visible gaskets for signs of degradation or liquid seepage, especially any seals which were removed as part of the inspection. Replace any suspect gaskets.

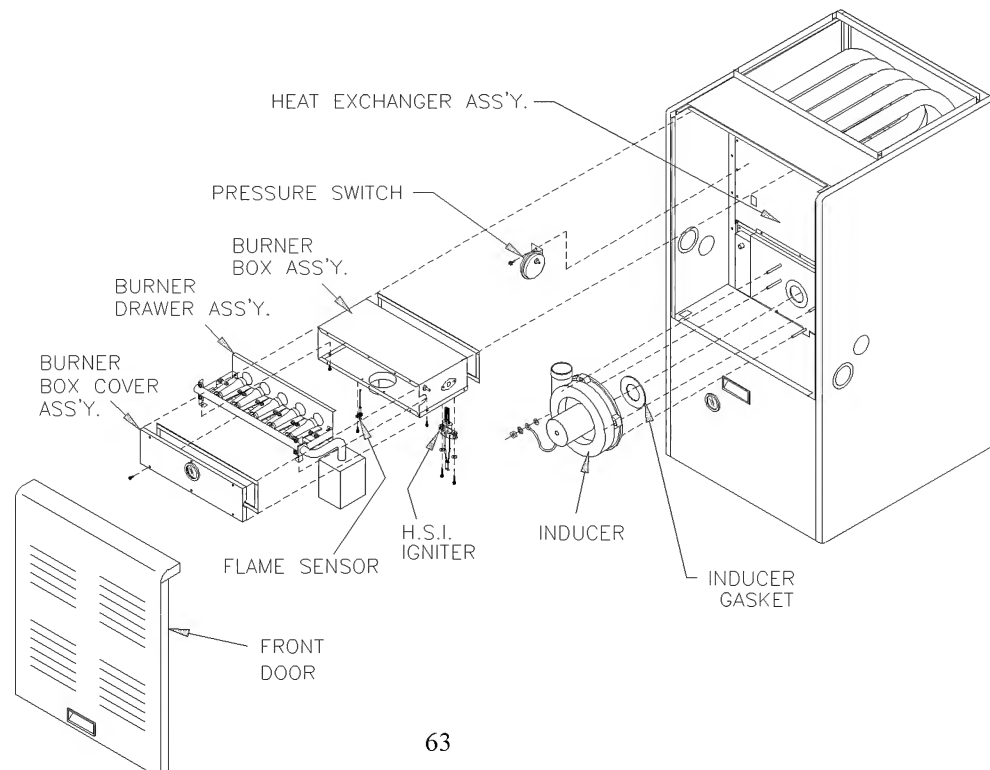
### C. HEAT EXCHANGER

Inspect for corrosion, pitting, warpage, deterioration, carbon build-up and loose gaskets in the flue pipe, burner box and accessible areas of the heat exchanger. If this inspection indicates heat exchanger cleaning is necessary (however unlikely), follow the heat exchanger cleaning instructions.

### CLEANING HEAT EXCHANGER

1. Turn off gas and electrical supplies to furnace.
2. In order to clean the heat exchanger, it will first be necessary to remove the heat exchanger.
3. HEAT EXCHANGER REMOVAL.
  - a. Disconnect the furnace from the gas supply and remove all gas piping which extends more than an inch into the furnace. Remove front door, flue and air inlet pipe, the pressure switch, the inducer, burner assembly and the burner box. **(NOTICE: Before removing the burner box, carefully remove the hot surface igniter and sensor so they will be protected from damage).** The wiring harness should be disconnected from all electrical components inside the main compartment and taped to the side of the furnace. (Refer to Figures 25 & 26 for parts identification, disassembly, and re-assembly procedure).

**Figure 25**

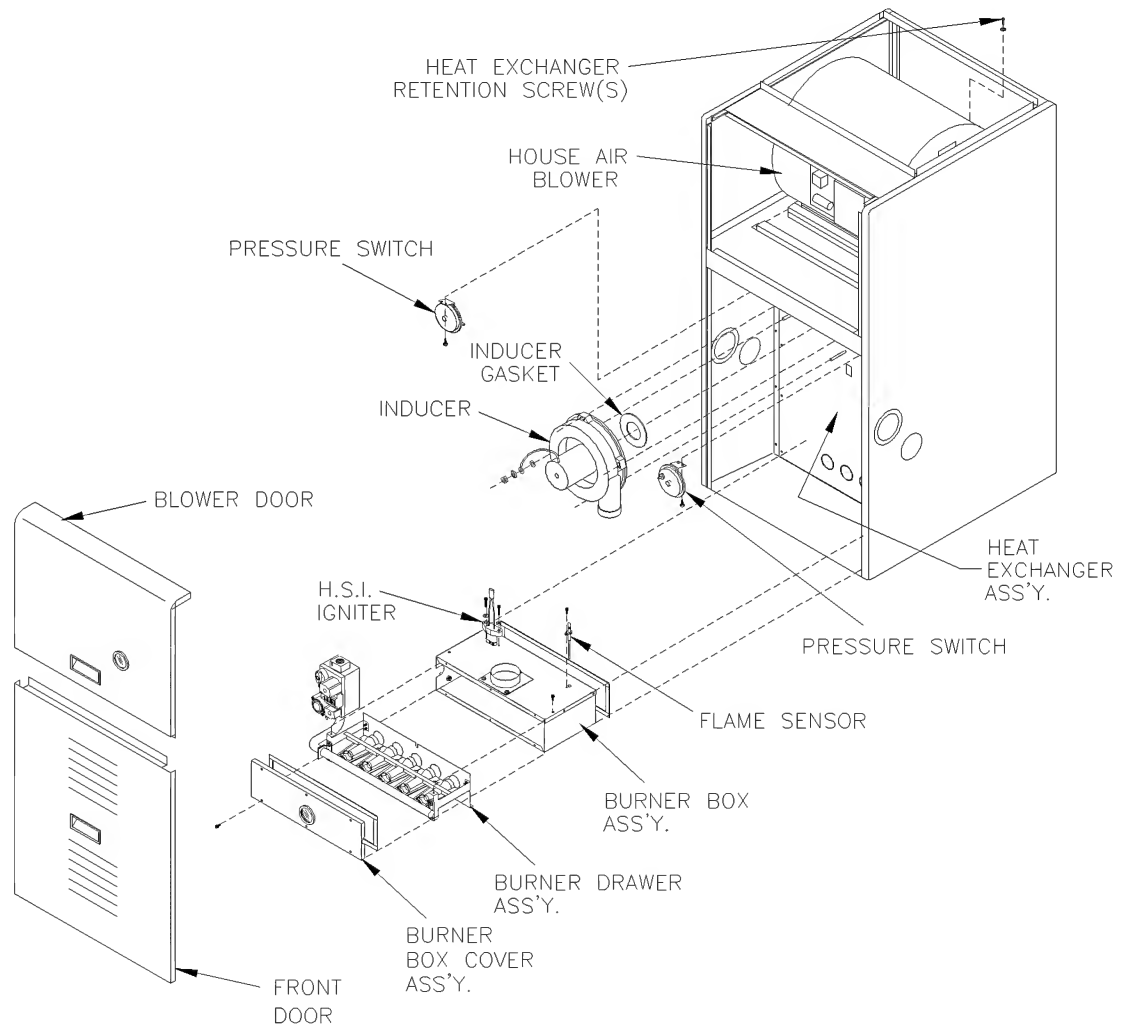


**All installations and services must be performed by qualified service personnel.**

**CDB'S ONLY**

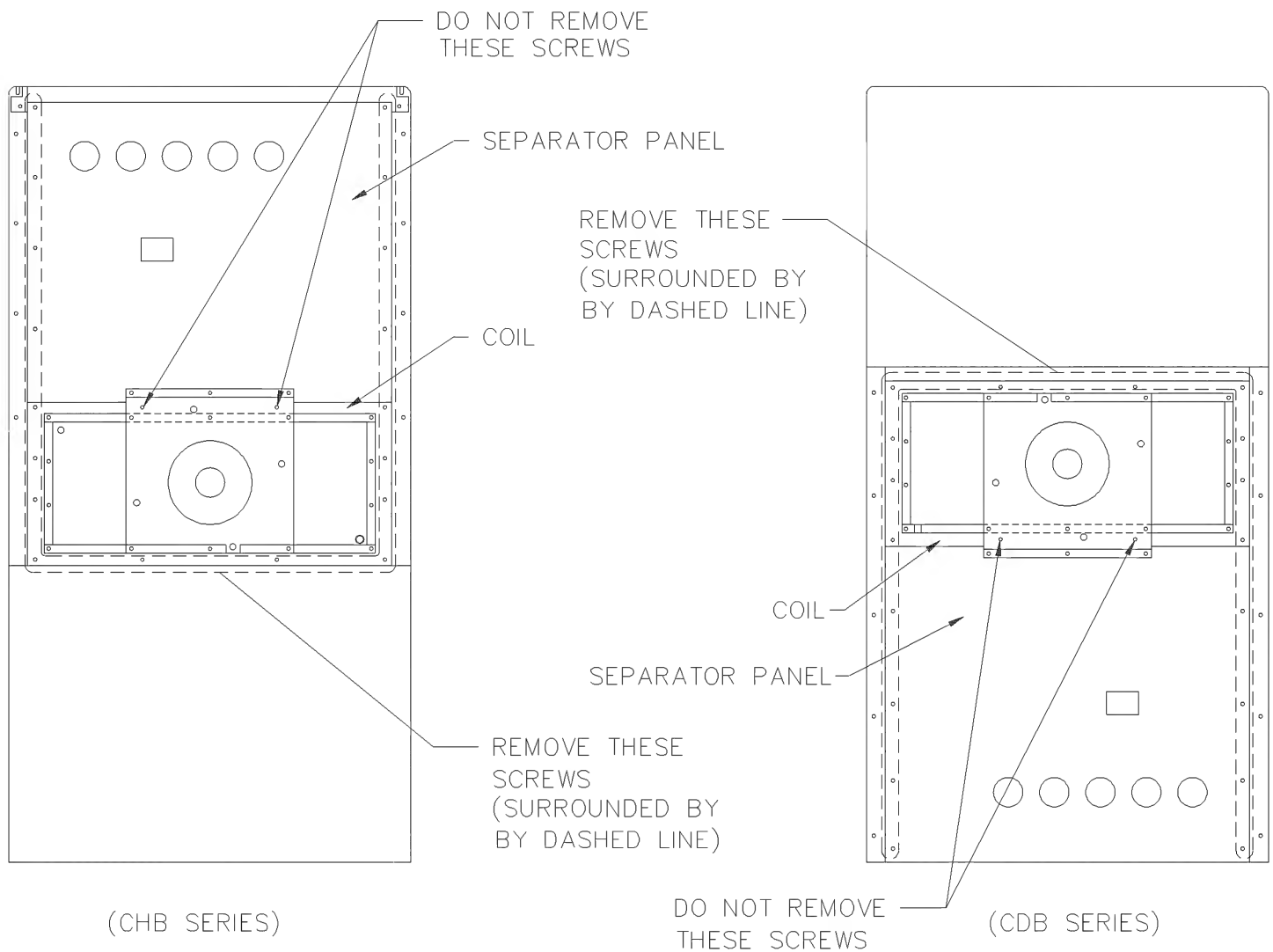
Remove the blower door and the house air blower. To remove the house air blower you will need to disconnect the outside power supply and disconnect the wire harness from the furnace at the quick connect junction in the blower pan. After removing the blower, the heat exchanger retention screw (the CDB-125 will have two) located behind the rear blower mount, will need to be removed (see Figure 26).

**Figure 26**



b. After removing all the components and the heat exchanger retainer screw (on CDB's) the inner row of screws holding the heat exchanger can now be removed (Notice the primary and secondary heat exchangers are connected and the two center screws between the separator plate and coil must not be removed (see Figure 27)).

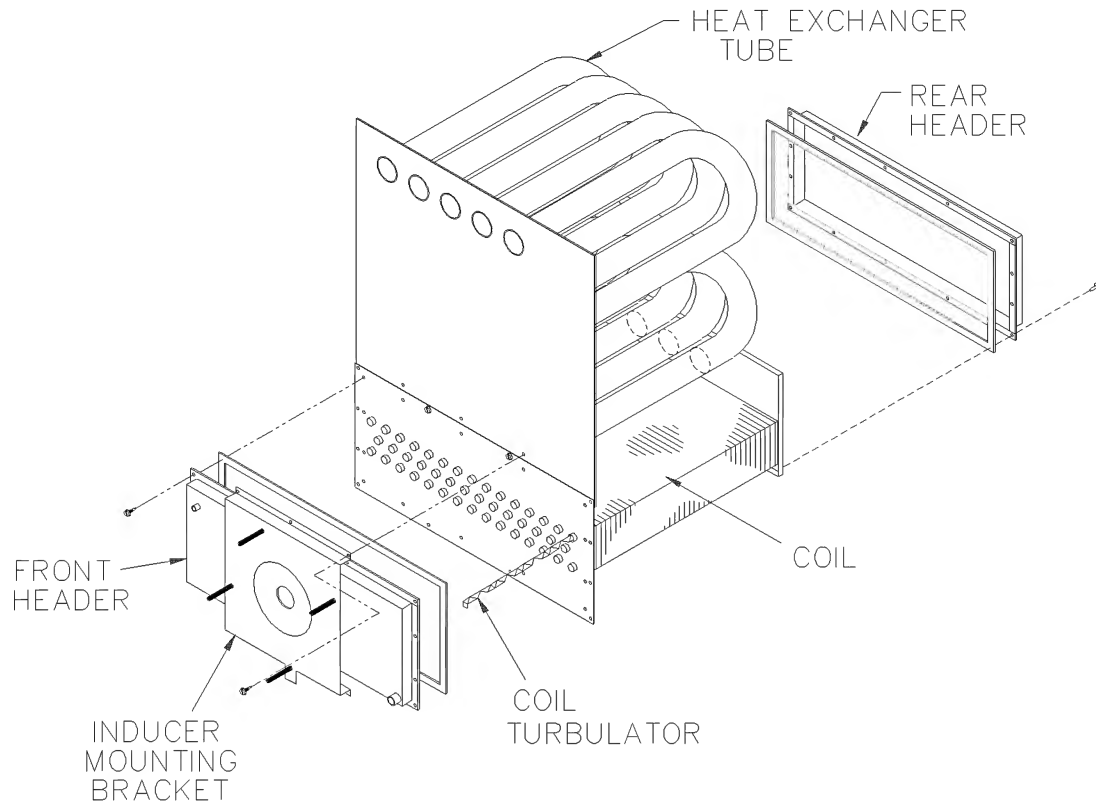
**All installations and services must be performed by qualified service personnel.**



**Figure 27**

- c. Pull the heat exchanger out through the front of the furnace being careful not to damage the coil.
- d. Once the heat exchanger is removed, take off the front and rear headers(see Figure 28).

**All installations and services must be performed by qualified service personnel.**



**Figure 28**

#### **4. CLEANING THE PRIMARY HEAT EXCHANGER**

a. Flush the heat exchanger with water using a garden hose until clean water only comes out of tubes then dry the heat exchanger thoroughly with compressed air.

#### **5. CLEANING THE COIL**

- a. Vacuum all lint and debris off the outside of the coil.
- b. Remove the turbulators and flush the coil with water. If necessary, use a pipe cleaner or soft brush (such as those used to clean fish tank filters) to remove heavier residue. Do not use any type of wire brush in the tubes.

6. Once the heat exchanger is cleaned, it must be reassembled and installed to the factory produced state (as shown in previous installations. All gaskets must be checked and replaced if they shown any signs of having been damaged).

**All installations and services must be performed by qualified service personnel.**

#### **D. HOUSE AIR BLOWER**

Check and clean the blower wheel, housing and compartment with a vacuum. Check the motor name plate and follow the motor manufacturers instructions for lubrication, if required.

**IMPORTANT:** Some motors are permanently lubricated **and should not be oiled.** See motor name plate for specific instructions.

##### **E. Cleaning the coil without removing the heat exchanger**

1. Remove the blower from the blower compartment. In order to remove the blower, it will first be necessary to disconnect the furnace from the outside power supply and disconnect the blower wire harness from the furnace at the blower pan quick connect.
2. Clean the coil with a vacuum cleaner by going through the blower pan opening being careful not to bend or damage any of the fins.
3. Once all components are cleaned, they must be re-installed to their factory produced state. (As shown in the previous illustration). Any seals or joints in the flue system which have been removed or loosened must be reconnected and sealed if necessary. Do this in accordance with the installation instructions.

**⚠CAUTION:** *The inducer motor mounting plate gasket and the collector box gasket must be replaced if they show any sign of having been damaged.*

**NOTICE:** After cleaning the furnace, reference the burner adjustment section of this manual. Check for operation, proper combustion, and gas leakage. Observe the burner flames and follow the adjustment procedures if proper flames are not present.

**NOTICE:** Before troubleshooting, familiarize yourself with the start up and check out procedure.

#### **F. RETURN AIR FILTER(S)**

The Return Air Filter(s): Provided with this unit is a permanent type filter. This filter(s) should be inspected and when dirty, cleaned or replaced, if necessary to assure proper furnace operation. Follow the cleaning, removal and replacement procedure below.

#### **FILTER MAINTENANCE PROCEDURE**

The filter rack will be located between the return air plenum and the return air opening of the furnace. (See Figure 20 for CDB's). Slide dirty filters out of the filter rack. Clean the filter by

**All installations and services must be performed by qualified service personnel.**

vacuuming, rinsing with tap water, hosing or dipping in an ordinary detergent solution. After cleaning, replace the completely dry filter in the rack. If the filter has a mesh, the mesh side of the filter must be towards the furnace.

## **FILTER REPLACEMENT**

Should the filter used require replacement, see Table 6 in Section, IV, N, for minimum filter areas required for the different types of filters available to ensure an adequate replacement is selected.

**IMPORTANT:** Remind homeowner of importance of monthly filter inspections during the heating season to ensure efficient and trouble-free operation of their furnace.

## **VIII. USER ROUTINE MAINTENANCE**

Complete instructions for the homeowner including maintenance procedures which must be performed by the homeowner/user can be found in the "Users Information Manual."

## **IX. TROUBLESHOOTING**

**NOTICE:** BEFORE TROUBLESHOOTING, FAMILIARIZE YOURSELF WITH THE START UP AND CHECKOUT PROCEDURE.

**ALL INSTALLATION AND SERVICES MUST BE PERFORMED BY QUALIFIED HEATING CONTRACTORS.**

To assist you in troubleshooting this furnace, it is equipped with an integrated ignition control with diagnostics. These diagnostics evaluate what control system has experienced a failure and will activate a flashing light on the control in different sequences to help pinpoint the failure which has occurred.

**IMPORTANT:** For your convenience, Thermo Products has installed a sight glass in the blower door of this furnace. The number of flashes in groups should be observed through this sight glass and recorded before turning off power to the furnace. Otherwise power to the furnace will be when turning off power or removing the blower door which is equipped with door interlock switch which will reset the control. Should this occur, it will be necessary to restart the furnace and have the failure occur again.

## **DIAGNOSTIC FEATURES**

The 50A50 control used on this furnace continuously monitors its operation and the operation of the system. If a failure occurs, the LED light on the control will flash a code. **If the failure is internal to the control, the light will stay on continuously. In this case, the entire control should be replaced, as the control is not field-repairable.**

**All installations and services must be performed by qualified service personnel.**

If the sensed failure is in the system (external to the control), the LED will flash in the following flash-pause sequences to indicate failure status (each flash will last approximately 0.25 seconds, and each pause will last approximately 2 seconds).

1 flash, then pause	system locked
2 flashes, then pause	pressure switch stuck closed
3 flashes, then pause	pressure switch stuck open
4 flashes, then pause	open high limit switch, open rollout switch, open auxiliary limit on CDB models
Continuous flashing (no pause)	Flame has been sensed when no flame should be present (no call for heat)

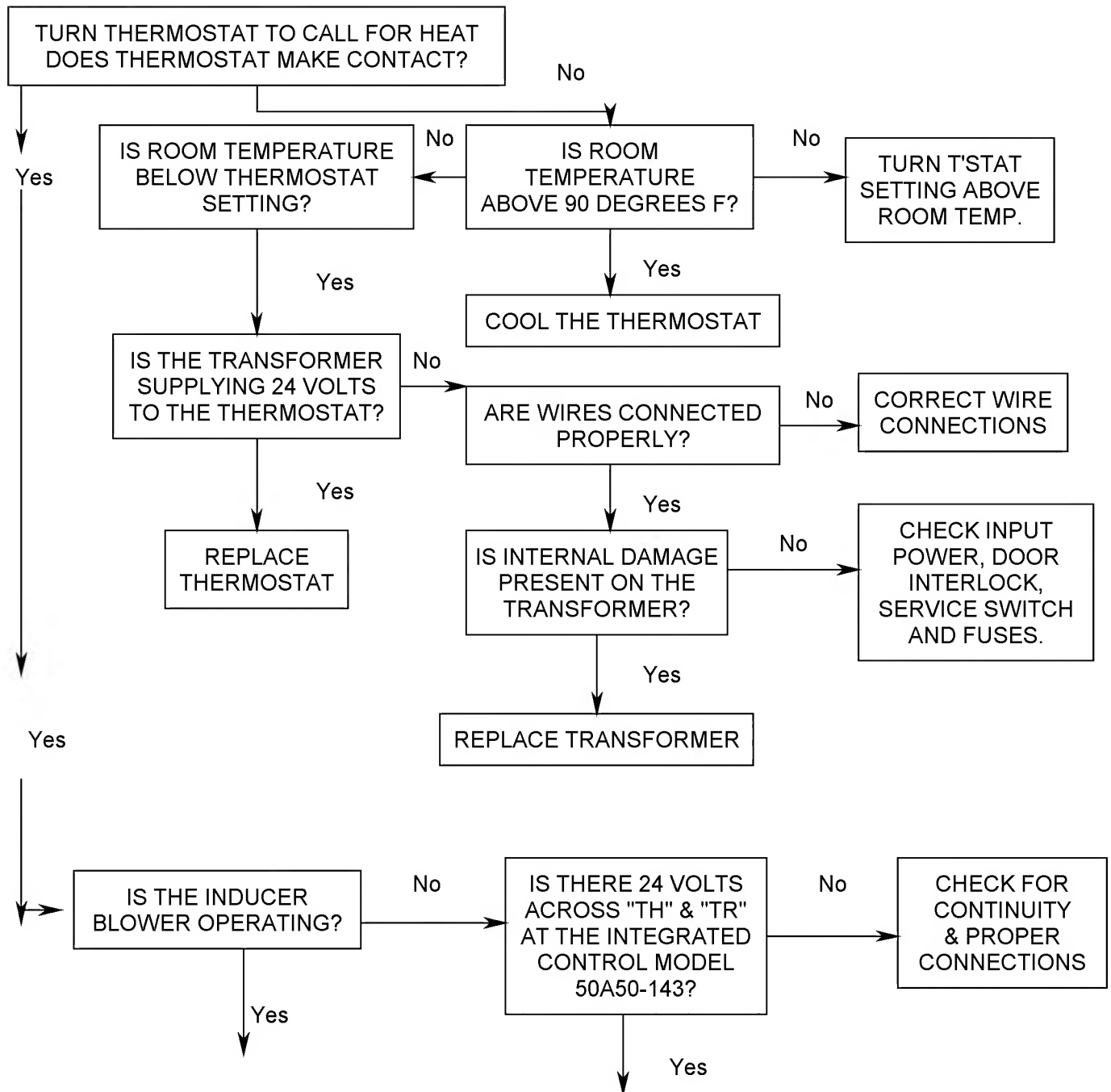
**The LED will also flash once at power-up.**

***⚠WARNING: Power must be disconnected before servicing.***

**All installations and services must be performed by qualified service personnel.**

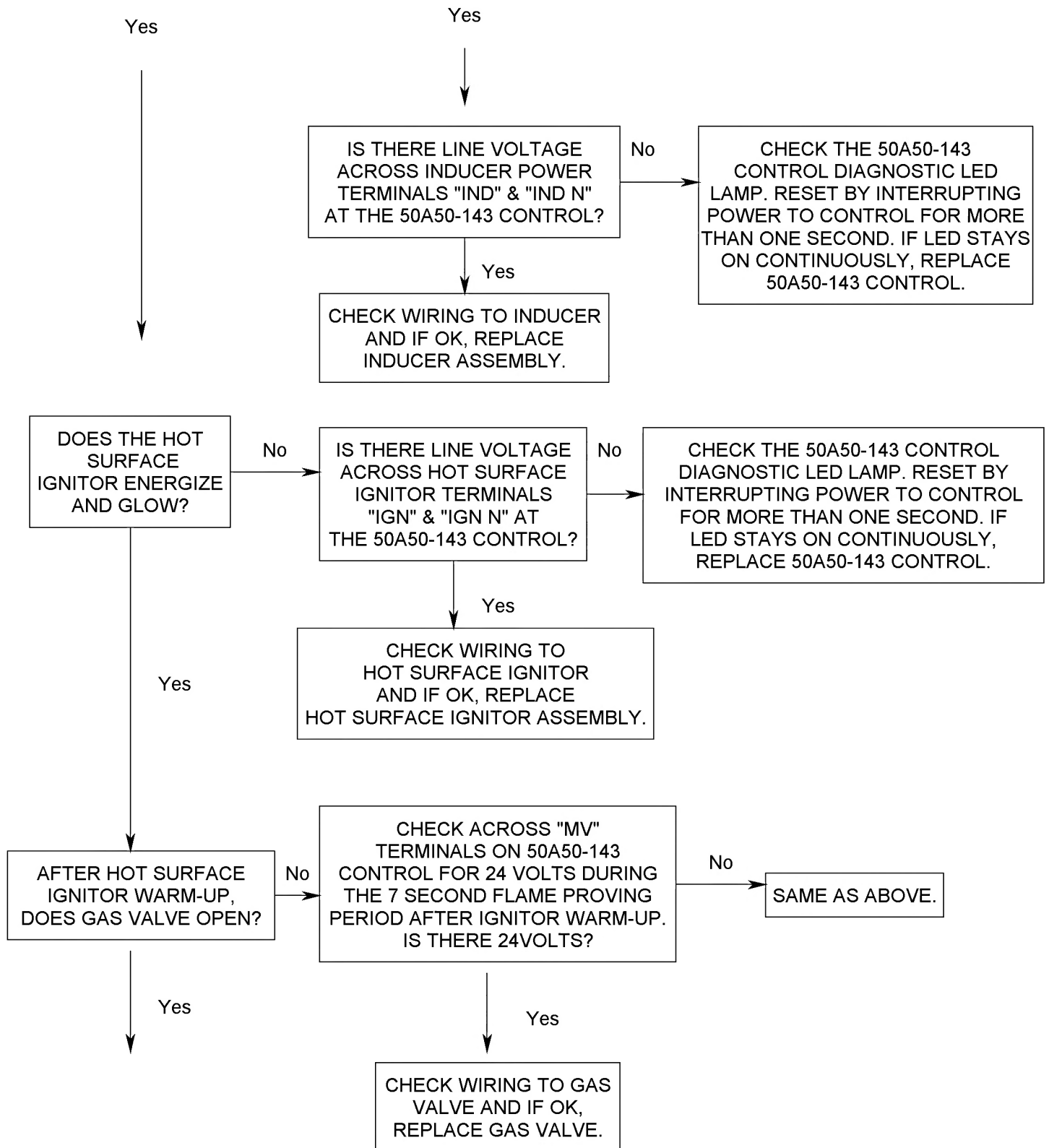
TROUBLESHOOTING GUIDE  
THE SYSTEM IS STARTED BY SETTING THE THERMOSTAT TO CALL FOR HEAT. THE FOLLOWING SHOULD HELP ESTABLISH THE TYPE OF MALFUNCTION OR DEVIATION FROM THE NORMAL OPERATION.

TO USE THIS DIAGRAM, YOU JUST NEED TO FOLLOW THE INSTRUCTIONS IN THE BOXES.

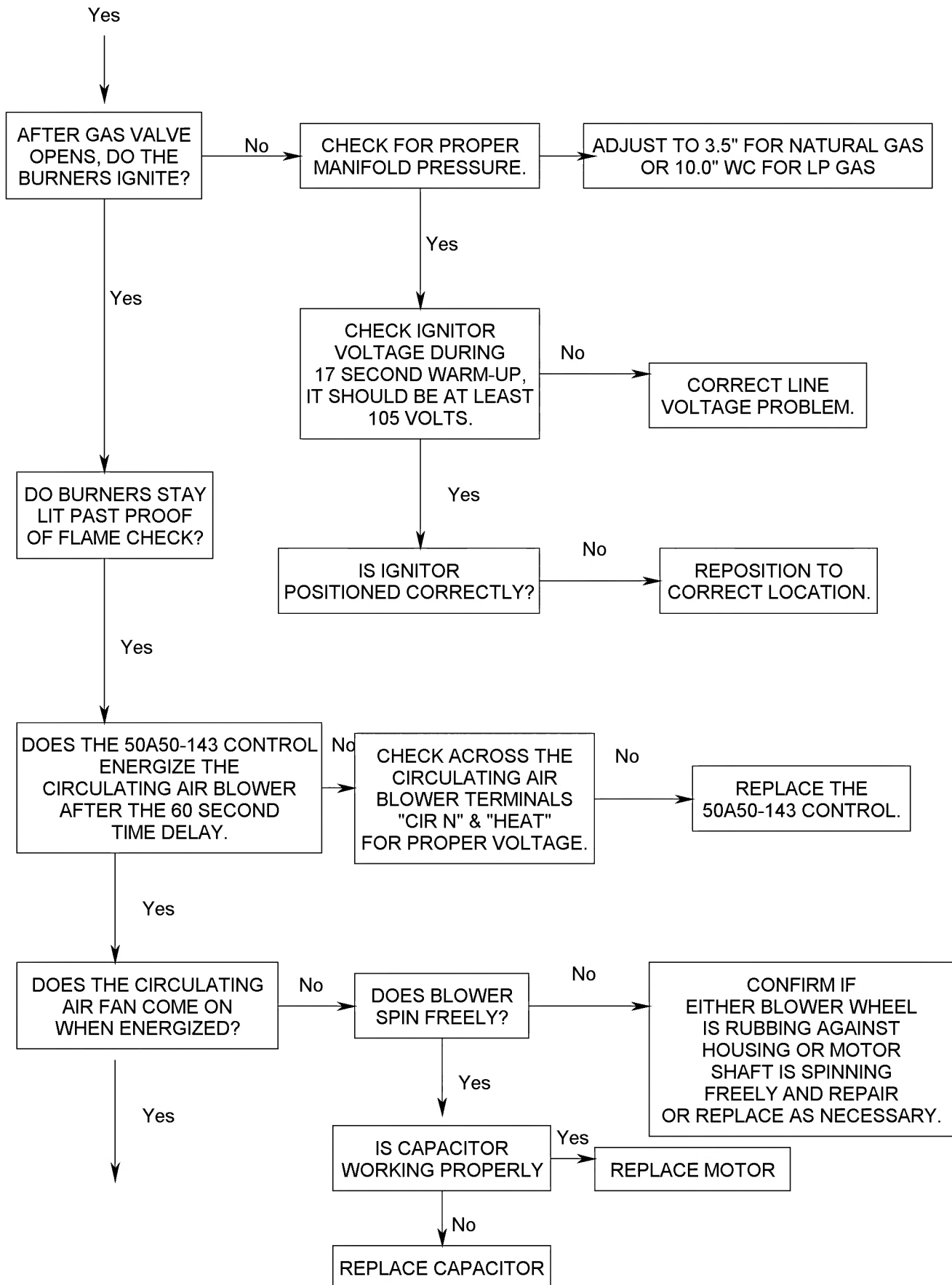




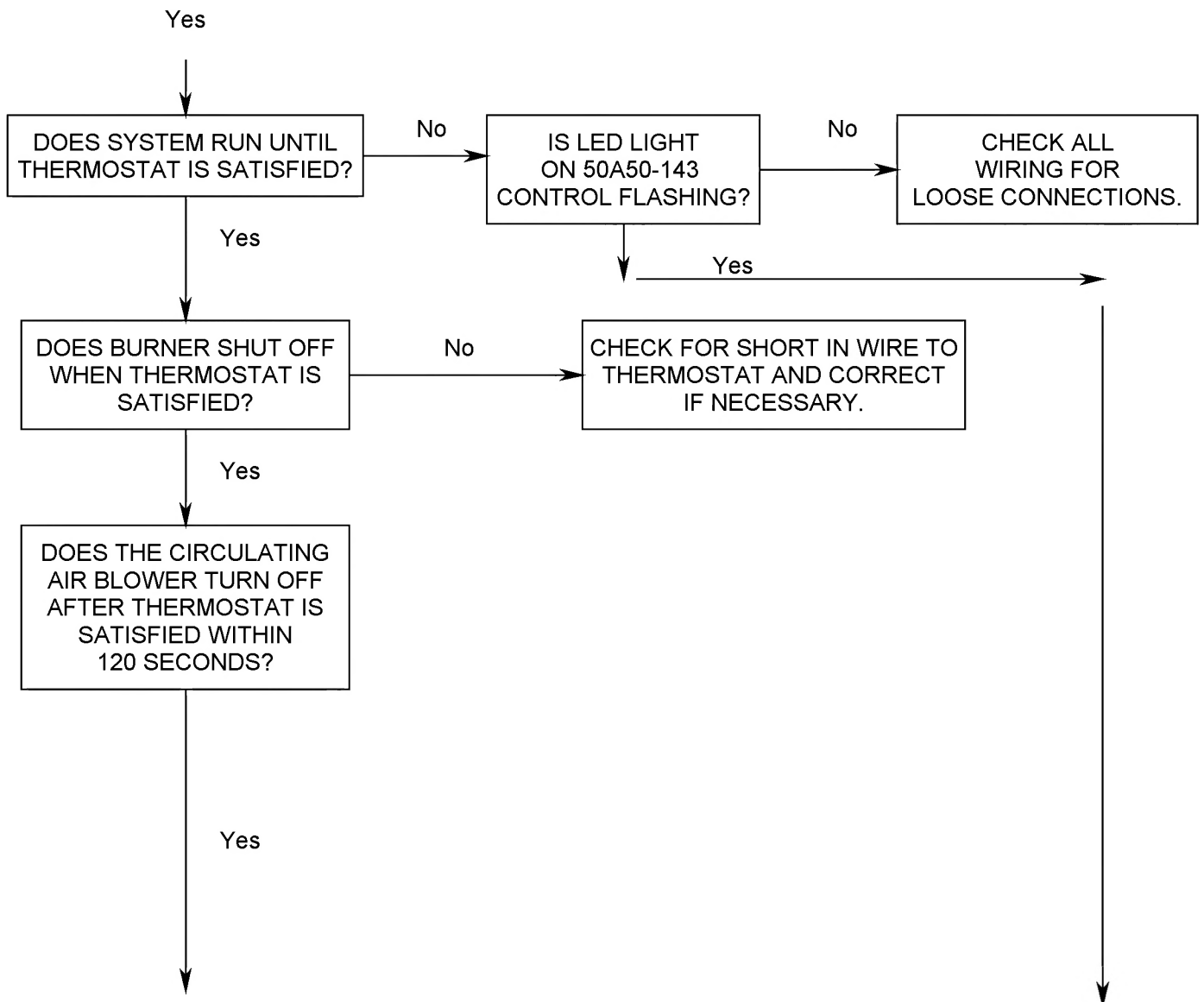
**All installations and services must be performed by qualified service personnel.**



**All installations and services must be performed by qualified service personnel.**



**All installations and services must be performed by qualified service personnel.**



**All installations and services must be performed by qualified service personnel.**

Yes



Yes



IF LED LIGHT FLASHES:

1 FLASH, THEN PAUSE,  
SYSTEM HAS LOCKED OUT.

2 FLASHES, THEN PAUSE, PRESSURE  
SWITCH STUCK CLOSED, REPLACE SWITCH.

3 FLASHES, THEN PAUSE, PRESSURE  
SWITCH CIRCUIT STUCK OPEN. CHECK THE  
VENT, COMBUSTION AIR INLET, AND DRAIN FOR  
BLOCKAGE. CHECK CIRCUIT AND REPAIR OR  
REPLACE SWITCH IF BAD.

4 FLASHES, THEN PAUSE, OPEN HIGH  
LIMIT, CHECK DUCT SYSTEM  
FOR BLOCKAGE, CHECK HIGH LIMIT  
CIRCUIT. CHECK FOR OPEN ROLLOUT SWITCH CIRCUIT,  
OR OPEN AUXILIARY LIMIT ON CCB MODELS

CONTINUOUS FLASHING, FLAME  
HAS BEEN SENSED WHEN  
NO FLAME SHOULD BE PRESENT.  
CHECK COMPLETE SYSTEM OUT.

LED LIGHT STAYS ON CONTINUOUSLY,  
COMPLETE FAILURE - REPLACE  
50A50-143 CONTROL.

TROUBLESHOOTING COMPLETE.